FOUNDED, 1904

The Far Eastern Review

ENGINEERING ✣ FINANCE ✣ COMMERCE

THE PIONEER IN ITS FIELD

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in Far Eastern Countries.

HEAD OFFICE: 5 JINKEE ROAD - - - - SHANGHAI, CHINA.
George Bronson Rea, *Editor and Publisher*
William Carter Rea, *Advertising Manager*

JAPAN OFFICE: H. C. Huggins, Representative,
No. 12 Takagi-cho, Akasaka-ku, Tokyo.
NEW YORK: British and Colonial Press, Inc.,
738 The Knickerbocker Building, Broadway and 42nd Street.
MANILA OFFICE: Fleming, Percy Smith and Seth,
Roxas Building, Escolta.
CHICAGO: British and Colonial Press, Inc.,
140 Dearborn St.
GREAT BRITAIN: Walter Judd, Ltd., 97 Gresham Street Bank,
London, E.C.
SAN FRANCISCO: Leroy P. Boyce, Monadnock Building

SUBSCRIPTION IN CHINA: $10.00 Mexican, U. S. & Philippines Gold $5.00, Elsewhere $12.00 Mexican per annum

VOL. XVIII JUNE, 1922 NO. 6

CONTENTS:

PAGE
WATCH NORTHCLIFFE ... 333
RIVER CONSERVANCY IN CHINA ... *338
New Harbor at Takoradi, Africa ... 339
SZECHUAN DEVELOPMENTS ... 340
THE ANSHAN IRON MINE DISTRICT, SOUTH MANCHURIA *341
Mining in Shantung ... 346
New Industry in the F.M.S. ... 346
DUTCH EAST INDIES DEVELOPMENT ... *347
Powerful Reclamation Dredger for Bombay ... 349
EXPORT TIMBERS OF THE PHILIPPINES ... *350
Douglas Fir Ties in China ... 352
Siamese Railways ... 352
THE "GREAT CHINA" COTTON MILL AT SHANGHAI ... *353
SWISS WATER TURBINES IN ASIA ... *355
Railway Electrification in Japan ... 357
EDITORIALS:
  John Foord ... 358
  Japan and the Gentleman's Agreement ... 358
  The Chinese Eastern Railway ... 359
  The Value of an Ounce of Gold? ... 361
  International Good Manners ... 361
  Political Agitation Affects Trade ... 362
  Root on China ... 362
  Don't Overlook Publicity ... 362
  None of Our Business ... 363
  Peking and the Consortium ... 363
  Japanese Railways 1921 ... 364
  A Scientific Products Laboratory for China... *365
  Wu Pei-fu's Financial Program ... *366
JAPANESE FLOUR MILLS ... *368
STEEL DIRECT FROM ORE ... *374
DAIREN HARBOR ... *376
Osaka's Road Program ... 380
New Typewriter Manufacturing Co. ... 380
ELECTRICAL DEVELOPMENTS IN JAPAN ... *381
Sprinklers in Sakhalin ... *384
IRRIGATION DEVELOPMENT IN SIAM ... *385
Kawasaki Estimating on Sydney Bridge ... 387
WORKSHOPS OF THE N.E.I. RAILWAYS ... *388
Mining in Celebes ... 391
American Colleges for Oriental Women ... 391
STEAM ROLLERS FOR CHINESE ROADS ... 392

**Illustrated with Maps or Photographs*

Entered at the U.S. Postal Agency, Shanghai, China, as second-class matter. Registered at the Chinese Post Office as a Newspaper. Entered at the Japanese Post Office as a Newspaper.

ALPHABETICAL LIST OF ADVERTISERS

Admiral Line, The ... 78
Allen & Co., Ltd., Edgar ... 33
American LaFrance Fire Engine Co. 21
American Locomotive Sales Corp. ... 25
American Tool Works Co. ... 1
Andersen, Meyer & Co., Ltd. ... 28
Attwater & Sons ... 48
Avery, Ltd., W. & T. ... 11

Babcock & Wilcox, Ltd. ... 31
Baldwin Locomotive Works ... 65
Bank of Chosen ... 52
Bank of Communications ... 57
Banque de l'Indo-Chine ... 54
Bank of Taiwan, Ltd. ... 55
Bliss Co., E. W. ... 27
Brill Co., J. G. ... 39
British-American Tobacco Company (China), Ltd. ... 62
Brunswick & Co. ... 71
Bucyrus Company ... 9
Butterfield & Swire ... 42

Canada Carbide Co. ... 15
Chartered Bank of India, Australia & China ... 48
Chicago, Milwaukee & St. Paul Railway 15
Clough, S. W. ... 4
Cole Marchant & Morley, Ltd. ... 74
Consolidated Steel Corporation ... 14
Craig & Donald, Ltd. ... 31

Dai-Ichi Ginko ... 60
Dai Nippon Brewery Co. ... 76
Dennis Bros., Ltd. ... Cover
Diamond Power Specialty Corporation 63
Dixon Crucible Co., Joseph ... 72
Dorman Long & Co., Ltd. ... 3
Drysdale & Co., Ltd. ... 71

Electricity Department, S. M. C. ... 4
English Electric Co., Ltd. ... 8
Evans & Sons (Wolverhampton), Ld., Joseph ... 2

First National Bank of Boston ... 61
Fuji Gassed Spinning Co. ... 10

Gelder, G. van ... 71
Gleniffer Motors, Ltd. ... 77
Green Island Cement Co., Ltd., The.. 20
Greenfield Tap & Die Corp. ... 11
Greening & Sons, Ltd., N. ... 4

Heap & Co., Ltd., Joshua ... 51
Hongkong Rope Manufacturing Co. . 20
Hongkong & Shanghai Banking Corporation ... 61
Hongkong & Whampoa Dock Co., Ld. 30
Hotel Statler Co. ... 49
Humber, Ltd. ... 75

Imperial Japanese Government Railways ... 66, 67
Industrial Bank of Japan ... 56
International Banking Corporation.. 53

Japan Sugar Mfg. Co. ... 6
Jardine, Matheson & Co., Ltd. ... 12
Jeffrey Manufacturing Co., The ... 63
Jones & Lamson Machine Co. ... 51
Jugo Ginko ... 54

Kanegafuchi Spinning Co., Ltd. ... 10
Kawasaki Dockyard Co., Ltd. ... 35
Kellogg Switchboard & Supply Co... 71
Kelvin, Bottomley & Baird, Ltd. ... 13
Kokusai Kisen Kaisha ... 43
Koster Co., The ... 39

London Directory Co., Ltd. ... 77
Low & Sons, Ltd., Archibald ... 75

Manning, Maxwell & Moore, Inc. ... 74
Mather and Platt, Ltd. ... 7
Metropolitan Vickers Electrical Co., Ltd. ... 77
McClintic-Marshall Products Co. ... 27
McConway and Torley Co. ... 21
Mills & Son Ltd., Edwin ... 63
Mitsubishi Bank ... 59
Mitsubishi Iron & Steel Co., Ltd. ... 38
Mitsubishi Marine & Fire Ins. Co., Ld. 38
Mitsubishi Shoji Kaisha ... 18
Mitsubishi Warehouse Co. ... 38
Mitsubishi Zosen Kaisha, Ltd ... 38
Mitsui Bank ... 59
Mitsui Mining Co. ... 18
Mitsui Bussan Kaisha ... 26
Modern Commercial India Illustrated Monthly ... 74
Morse & Son, Inc., A. J. ... 77
Motor Rail & Tram Car Co., ... 41
Mount Vernon Car Mfg. Co. ... 9
Mustard & Co. ... 4

New Engineering & Shipbuilding Works ... 34
Nippon Menkwa Kabushiki Kaisha.. 50
Nippon Yusen Kaisha ... 46, 47
Nobels Industries, Ltd. ... 22

Okura & Co. (Trading), Ltd. ... 24
One Hundredth Bank, Ltd., The ... 60
Osaka Shosen Kaisha ... 44

Pacific Steamship Co. ... 78
Pittsburgh Steel Co. ... 19
Pooley & Son, Ltd., Henry ... 2

Royal Bank of Canada ... 61
Ruston & Hornsby, Ltd. ... 21
Ryerson & Son, Joseph T. ... 5

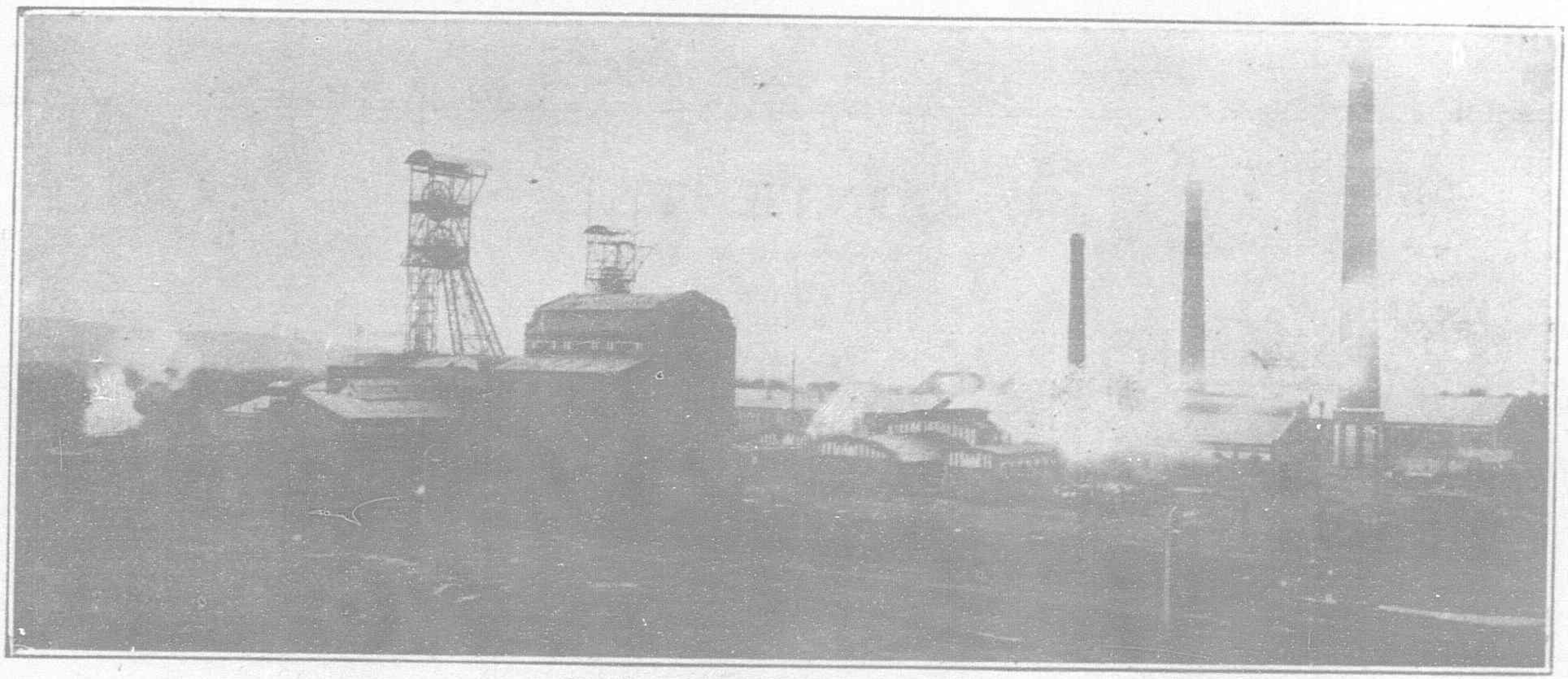
Sale & Frazar, Ltd. ... 16
Selson Engineering Co., Ltd. ... 76
Scottish Tube Co., Ltd. ... 13
Shanghai Dock & Eng. Co., Ltd ... 32
Shanghai Municipal Council ... 4
Shantung Railways ... 70
Siebe Gorman & Co., Ltd ... 7
Simons & Co., Ltd., Wm. ... 19
Sino-North American Co., Ld. ... 36
Smith Major & Stevens, Ltd. ... 15
South Manchuria Railway Co. 64, 68, 69
Standard Oil Co. of N. Y. ... 29
Sumitomo ... 58
Sumitomo Bank, Ltd. ... 58
Superheater Co., The ... 19

Texas Co., The ... 17
Thornycroft & Co., John I. ... 1
Tokyo Electric Co. ... 76
Toshin Soko ... 40
Toyo Kisen Kaisha ... 45
Transatlantische Handels-Kompagnie, m.b.h. ... 19
Trimont Manufacturing Co. ... 7

United Cigarette & Machine Co. ... 41
United States Steel Products Company ... 23, 37, Back Cover

Walworth International Co. ... 78
Whittall & Co., Ltd., J. ... 6
Wild & Co., M. B. ... 9
Williams & Co., J. H. ... 41

Yarrow & Co., Ltd. ... Cover
Yokohama Dock Co. Ltd. ... 33
Yokohama Specie Bank, Ltd. ... Cover



The Tzuchuan Colliery, Shantung

TZUCHUAN COAL

The Cheapest and Best Coal Mined in the Far East

Annual Output: 600,000 tons.
The Coal is washed, screened, and classified for the market into five grades, viz., Lump, Slack, and Washed Coal Nos. 1, 2 and 3.
Tzuchuan Coal contains a large amount of coke, with only a small amount of ash, and has a heating capacity of 7,500 calories.
Tzuchuan Coal, which rivals the best Cardiff Coal, is highly recommended for Coke and Briquette manufacture, for Boiler and Marine use and for General Domestic use.
Tokuyama Briquette Factory, Yawata Iron and Steel Works, and many other important works in Japan and China are constant purchasers.
The Wharves at Tsingtao are well accommodated as Coaling Stations for Coast and Ocean liners.

For further information please apply to the

SHANTUNG RAILWAY ADMINISTRATION

Cable Address: "SANTETSU"
TSINGTAO, CHINA
Codes: A.B.C. 5th Ed. & A.1.

大正七年七月十日第三種郵便物認可

YALE UNIVERSITY
FEB 27 1923

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

上海仁記路第五號

遠東時報

WATCH NORTHCLIFFE

JAPAN'S FLOUR MILLS

DAIREN HARBOR

ANSHAN IRON MINES

N.E.I. RAILWAY SHOPS

IRRIGATION IN SIAM

GREAT CHINA COTTON MILL

JAPAN'S ELECTRICAL DEVELOPMENT

CHINESE EASTERN RAILWAY

Vol. XVIII JUNE, 1922 No. 6

SHANGHAI, PEKING, TOKYO AND MANILA

10
22
18 c6

FURTHER BIG REDUCTIONS

DENNIS

COMMERCIAL MOTORS

Practically back to Pre-War Prices

Type	To-day's Price	Price Jan., 1921	Reduction
2-2½-ton Standard Lorry Chassis...	**£730**	£ 997	*£267*
2-2½-ton Long Char-a-bane Chassis	**£750**	£1,007	*£257*
3½-4-ton Lorry Chassis	**£865**	£1,195	*£330*
3½-4-ton Char-a-bane Chassis ...	**£880**	£1,190	*£310*
4-ton Long Wheelbase Omnibus Chassis	**£950**	£1,200	*£350*
5-6-ton Lorry Chassis	**£960**	£1,320	*£370*

The prices given above are F.O.B. Guildford, England

WITH a view to stimulating trade and maintaining employment, we have written down our Stocks to a figure very much under cost, and this, with the wages reductions that will take place in the near future, has enabled us to sell our Chassis as from October 1st at the prices mentioned opposite.

Purchasers of "DENNIS" vehicles, even at such low prices, can feel perfectly assured that they are acquiring absolutely new goods of latest and most improved construction, as Dennis Brothers have never purchased or taken back second-hand War Lorries. The Vehicles we are offering are absolutely new and embody improvements on previous models. We have been able to keep our factory busy on new productions, and are not selling Chassis made two to six years ago and re-purchased from the Government, nor are we offering re-conditioned War Chassis.

WRITE FOR PARTICULARS:—

Agents:

Messrs. Wearne Brothers, Ltd., 310 Orchard Road, Singapore.
Messrs. Perrin Cooper & Co., Consular Road, Tientsin.
Messrs. Central Garage Co., 9 Hongkong Road, Shanghai.
Messrs. Alex Ross & Co., Ltd., Machinery Department, Hongkong.
Messrs. Fikkert Motor Car Co., Weltevreden, Batavia.

Cables: A.B.C. 5th Edition,
Lieber's, Bentley's, Marconi.

DENNIS BROS., LTD.

GUILDFORD, ENGLAND

D 221

SHALLOW DRAUGHT LAUNCH—YARROW SYSTEM,

built by

YARROW & CO., LTD., Glasgow,

(formerly of Poplar, London).

Yarrows, Limited, of Victoria, British Columbia, Shipbuilders, Ship Repairers and Engineers, are associated with Yarrow & Co., Ltd., Glasgow.

Length. 160-ft.; Beam, 24-ft. 6-in.; Draft, carrying 40 tons, 2-ft. 3-in.; Speed, carrying 40 tons, 15 Statute miles an hour, burning wood fuel only

Vessel as above illustrated can be shipped whole to any part of the world.

Messrs. YARROW Construct Fast Passenger and Commercial Vessels, Shallow Draught Steamers, Tugs, etc., propelled by Sternwheels, Side Wheels, or Screws working in Tunnels fitted with Yarrow's Patent Balanced Hinge Flap.

RIELLEY, SIMMONS & MILNE, Agents, Shanghai.

FOUNDED 1898

JOHN FOORD

A Fearless Journalist of the Old School; He organized the American Asiatic Association in 1898 to combat the Closed Sphere policy of European Powers in China. Former Editor-in-Chief of *The New York Times*, *Harper's Weekly*, Editor and Founder of *Asia*, who died in New York at the age of 78 from injuries received in an automobile accident.

(From The New York Times)

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVIII SHANGHAI, JUNE, 1922 No. 6

WATCH NORTHCLIFFE

Some Simple Words of Common Sense

(Japan's Standing Army Numbers 230,000 Men)

ONE wonders just what is at the bottom of the new anti-Japanese campaign launched in England by Viscount Northcliffe. Coming as it does immediately after the Washington conference and the collapse of the former campaign to provoke hostilities in the Pacific, it would seem that the owner of *The Times* had decided to fire the hearts of the British into taking over the job that America rejected.

Thanks to the Washington conference, war between Japan and America was averted by a frank exchange of views and the whole world now knows exactly where Japan stands in regard to her policies on the mainland of Asia. Is her word to be doubted and her honor placed in question before she has even time to make good? Have the prime-movers of the anti-Japanese campaign prevailed upon Northcliffe to carry on and keep alive the agitation in the hope of discrediting Japan in Great Britain, and turning the British against their former ally in the same manner as they almost provoked a war between Japan and America by their one-sided testimony? The anti-Japanese agitation received a well-merited rebuke in the United States. The Americans will have none of it and there are indications that an official enquiry is to be started in order to ascertain who was at the bottom of this diabolical attempt to bring about hostilities in the Pacific. Yet Northcliffe takes up the campaign where the American fire-eaters left off, with a vehemence and virulence that relegates them to a back seat.

Japan's Army for Defense

"For what purposes are the great Japanese home and overseas army and the great Japanese fleet being maintained," he asks and then answers the question to his own satisfaction: *For the control of China.* Northcliffe might have answered that question by a little superficial study of Far Eastern history without swallowing hook, bait sand sinker the stories told him by those interested in creating a wrong impression. He would have been able to state, and state truthfully, that Japan is maintaining a large army for the identical reason that his own government insists upon having the greatest navy on earth, for the identical reason that France maintains the largest army in Europe, for the identical reason that Italy refuses to disarm, for the identical reason that France demanded an adequate submarine force to protect her against a possible enemy, for the same reason that all nations of real men have from time immemorial maintained large armies and fleets and for the same reason that these same nations of men will continue to do so until the trump of Gabriel's horn sounds the end to all mundane strife. Japan is maintaining her great army for defense.

Against whom? For the same reason that the late allies are preserving intact their fighting forces in Europe, with this difference. While the allies fear Germany, Japan is watching Russia. It is nauseating to read the arguments advanced to justify the maintenance of allied forces in preparation against a war of revenge on the part of Germany when the latter nation is down and out for another twenty-five years, and then read the villification of Japan by the same writers because she insists on applying the same law of self-preservation against the possible come-back of Russia. It is the most hypocritical piffle that has ever disgraced the pages of European and American journalism. What is good for England, for France, for Italy, is good for Japan. Her old enemy outnumbers her four to one, and if Japan ever goes to sleep and listens to the siren song of the pacifists, her days as a nation will be numbered, in the same way that if Britain ever surrenders her naval supremacy, the story of her greatness will become ancient history.

Now Northcliffe would have the world believe that the Japanese army is maintained for the sole purpose of conquering China. He is not impartial enough to state that China's weakness has been the bridge over which Russia has in the past advanced to the conquest of Japan. In the sudden passion to befriend China, Northcliffe loses sight of the fundamental moves of twenty-two years ago which gave rise to the whole Far Eastern problem, the moves by which Russia would have gained her objective and found the coveted road to India through the domains of her ally and dupe. Northcliffe overlooks that the war of 1905 was not only a life and death struggle for Japan, but one in which the very existence of the British empire was at stake. For had Russia gained the victory, her armies would have swarmed into Western China, into Tibet, down through the passes of the Himalayas, and taxed the man-power of the British empire to have kept them from overflowing into India. Why do British writers close their eyes to these truths and refuse to recognize Japan's precarious position? Is it not true that Russia's preparations for a war of revenge, compelled the Japanese to stagger under a heart-breaking burden of taxation in order to maintain their fighting forces at a level that would enable them to defend themselves (and the British empire) when the day arrived for Russia to again take the field? Is it not true that Russia amputated Mongolia from China for the sole purpose of attacking Japan's position in Manchuria from its most exposed side? Is it not true that Russia was secretly building her strategic railways from Bokhara to the Afghan frontier at the same time? Why then should Japan relinquish her one guarantee of national existence in order to meet the criticisms of those who demand that their own defenses be maintained against the recuperation of Germany?

An Overworked Bogey

Northcliffe is holding up the bogey that has been worked to death for the past ten years in order to frighten China. *The Japanese will get you if you don't be good.* This old scarecrow has served its purpose, and something else must be found to take its place. As we pointed out only last month, the Japanese are "fed up" with this propaganda, and public opinion will rebel at any further attempt to make their country the "policeman of China." Northcliffe is perhaps ignorant of the fact that on two occasions during the war when foreign lives and properties in North China were menaced by internal disorders, the Japanese minister was requested by his colleagues to have Japanese troops sent to China for police duty. That can never happen again. Hereafter, if the present temper of the Japanese people holds good, other powers will have the opportunity of demonstrating their real friendship for China by sending their own troops to protect their nationals and properties in the event intervention becomes necessary.

Suppose Northcliffe's question was answered in this wise; Japan is maintaining a huge army in order to be ready at a moment's warning to assume a humanitarian duty that the British, American or other foreign armies cannot be relied upon to perform. Remembering that in the past, the diplomatic corps at Peking when confronted with a grave crisis, has requested Japan to send troops to China to protect foreign lives and properties, and that present conditions in this country may lead to another such crisis, would Viscount Northcliffe care to place the facts squarely before the British public and tell them frankly that they must be prepared to send 100,000 or more troops to China in order to fully protect British interests? Or, would he, if the occasion arises, revert to his old platform and call upon the "Honorable Ally" to take over the burden of protecting British lives and properties in China? He could not consistently do this, so he would be compelled to tell the British public the truth, that the Japanese army will never be employed as a police force for the benefit of other foreigners in China. If China fails to put her house in order and invites intervention, and Japan adheres to the above policy, perhaps Northcliffe will explain to the British people just how much it will mean in military expenditure for the protection of their interests in China.

Northcliffe sounds the warning, "Watch Japan." Suppose the tables were turned and Japan controlled the greatest newspaper in the world, and asked the same questions about the British navy and warned its readers to "Watch England." Would he be willing to admit that Great Britain requires watching? Has not Great Britain been actively engaged while others were talking and consolidated her hold on the approaches to India, taking over Mesopatamia, emasculating Persia and bringing Hedjaz under her protecting wing? Has Great Britain relaxed in any way her grip on Tibet or overlooked any minor point in the great game of empire? Did Japan sound the warning, "Watch Britain," while she was so intently safeguarding her own interests against the day when Russia will resume her onward march? Why watch Japan, when she also is preparing against the same menace?

Is Japan Justified?

Is Japan justified in maintaining an effective army for defence? Who is to be the best judge of Japan's necessities? Who can fathom the exact meaning of the recent alliance entered into between Germany and Russia in open derision of the Genoa conference? Is not all this in line with policies already exposed, a confirmation of the statement made to Kenneth Roberts of the *Saturday Evening Post* year before last by the German commissioner of emigration? Siberia is to become the land of promise for Germany's millions, the Altai mountains the storehouse from which Russia and Germany will draw their supplies of iron, copper and gold that will enable them some time in the future to again re-open the conflict for world dominion. Is not every word of that frank statement of intentions being corroborated by events? Has not Mongolia once more passed under the control of a people's revolutionary government directed by Soviet advisers, the properties of foreigners confiscated, their business ruined and themselves compelled to flee from Urga? Does not everything point conclusively to the working out of a set program in this part of Asia, which once more must involve Japan in a life and death struggle because of the inability of China to perform her international duties?

Let us turn to the picture in Europe, where every sign points to another general outbreak as a result of the Russo-Germanic defiance of the allies, with France grimly determined to protect herself against the new menace. The significant speech of Clemenceau at Nantes was not needed to emphasize the gravity of the situation. Facing a new Russian offensive, Poland is caught between the jaws of the nutcracker. The collapse of Poland will be followed by the fall of the little entente, leaving France once more standing alone with her back to the wall facing this new coalition. Who can most effectively hold Russia in check; the British army or the battalions of the Mikado? In view of this crisis, pregnant with grave events, who has the right to challenge or question the reasons for the maintenance of a great army by Japan? Notwithstanding the opinions of Northcliffe, it is just possible that the Japanese are living up to the traditional spirit of the Samaurai, that obligates them in honor to stand by their allies and be ready at a moment's notice to assume their share of the burden in carrying out the pact of Versailles. No critic has the right to question the *bonâ-fides* of Japan at a moment, when the fate of Europe hangs in the balance.

Who Will Protect China's Integrity?

At a recent conference of Japanese admirals and other high officials at Tokyo, a resolution was adopted to the effect that every precaution must be taken by extending connections with neighboring regions to make sure of supplies, and thus, in the event of war, ensuring a drawn battle. *The Times* regards this as a serious symptom of misinterpretation of the Washington conference and believes it is the intention of Japan to develop economic relations with China, exploiting her resources in order to compensate for the restrictions imposed at Washington on the naval expansion of all the participants in the conference. In other words, Northcliffe again says, "Watch Japan." Why not watch the developments in Europe, in Central Asia, which compel Japan to be on her guard night and day against a forward movement of the Soviet? Who is to undertake the preservation of the *status quo* in Mongolia? Under no conditions will an American or British army ever be disembarked upon the shores of Eastern Asia for the purpose of preserving intact the integrity of China and giving effect to the principles underlying the consortium agreement which holds that Mongolia is a most important part of China. Who is to defend this fundamental principle of the powers interested in the preservation of the Chinese republic? If America, Great Britain or France cannot be relied upon to check the "menace from the direction of Urga," and impotent China cannot safeguard her own integrity, who then, is called upon by the highest law of self-preservation to step into the breach? Are we to believe that *The Times* now favors Russia having a free hand in Central Asia, making herself the overlord of Mongolia in order to carry out the self-confessed designs of Germany in these regions, and bring Russia once more into a position where she can attack Japan upon her exposed flank in South Manchuria? Is Japan to be emasculated in order that Russia may gain a position that menaces her very independence? Unless Northcliffe can give some better explanation than has yet appeared in *The Times*, it would appear that Japan is being held up to world odium, in order to divert attention from the activities of Russia and Germany. Northcliffe might explain to the British people just how they will protect India, once a German controlled Russia is firmly established in Mongolia. There may be some understanding that will relieve India from this pressure, but we reject this at once as wholly inconsistent with British sense of honor. With a full knowledge of the march of events in Central Asia, it is difficult to understand a change of policy which consigns a faithful ally to the scrap heap as soon as her usefulness is terminated. We can understand Northcliffe's sympathy with China and his campaign for the cancellation of the Anglo-Japanese alliance, but we cannot understand why it is being prolonged when every sign points to the time when Japan may again have to take active steps to defend her vital interests. Is Japan to be made the target of a new propaganda, while Russia and Germany are upheld in an alliance which cements the latter's hold on Siberia and hands Mongolia over to them both? If the

Japanese army is to be reduced with these events transpiring under our noses in Central Asia, who is to defend the integrity of China, who is to give effect to the consortium principles, who will counteract the pressure upon India, who will guarantee that Japan's vital interests will not be placed in jeopardy ? Let Northcliffe answer this question fairly, and the world will gather a better idea of the drift of his propaganda. This attempt to isolate Japan by turning world opinion against her and leaving her friendless in the event of a clash in Eastern Asia, has a deep significance, one which will not pass unnoticed by all fair-minded peoples and governments.

Northcliffe tells his readers to "remember the Twenty One Demands" which Japan attempted to force upon China while Great Britain was plunged in war and then goes on to enumerate them all over again, just after Japan has surrendered at Washington all that she gained through their imposition, with the sole exception of the lease to the Liaotung peninsula. What is the object of raking up these old demands in this fashion at this time ? To call attention to Japan's retention of Port Arthur and the Liaotung territory ? If this be so, then Northcliffe might read with considerable profit and enlightenment the reasons given by Mr. Balfour at the Washington conference for Great Britain's retention of the Kowloon lease. It ought to be a liberal education to him on fundamental Chinese problems.

Japan's Existence Imperilled

American editors have received a liberal education in world politics since 1914. They have learned to think for themselves. They may not as yet fully grasp all the intracacies of Asiatic politics and policies, but they are learning. From a mass of American editorial comment on the recent Russo-Germanic alliance, we select the following from the well-informed *Boston Transcript*:—

> "Not enough of the details of this alliance are known at this writing to warrant any attempt at an analysis of it, but it is quite plain that the signing of the agreement, over the heads of the inviting powers of the conference, will necessitate an entire readjustment, and a much closer adjustment, of the relations between the Western European powers—unless, indeed, Lloyd George himself is in the plot, and has made up his mind to throw France overboard for good and all for an understanding with Germans and Bolshevists. As such an explanation is untenable, it is clear that the original and main purpose of the conference itself—which was to unite all Europe for a stabilization of exchanges—is wrecked by the special arrangement now entered into between Germany and Russia."

If Northcliffe desires to create the impression that Britain has thrown over her old allies for some understanding with Germans and Bolshevists, he is going the right way about it. Fortunately, however, the world also understands something of the difference of opinion which estranges the owner of *The Times* and the premier of Great Britain, and makes allowances. The unreasoning anti-Japanese propaganda of *The Times* at this time can therefore only set others to pondering over signs and portents which lead to the suspicion that this sudden outbreak against Japan may conceal some new understanding, some new line-up, in which Germany, Russia and China are to be encouraged into forming a combination that will eventually eliminate Japan as a serious competitor in world trade by shutting off her raw supplies in neighboring regions on the mainland of Asia.

Japan made great sacrifices at Washington in order to dispel misconception about her policies. She accepted the dictum that her people may not overflow into lands pre-empted by the white races to expand in ; she acquiesced in a policy which prohibits her people from owning land in Manchuria and Mongolia in deference to Chinese ideas about their sovereign rights ; she accepts the verdict that there is no place in the world (except South America and some isles of the Pacific) where her people may emigrate to, and says in effect : "We accept your plan for the limitation of naval armaments, we forego our ideas of conquest and will keep our children at home and develop our place in the sun as an industrial nation and face you in the struggle for existence on an equal footing. All that we ask in return is that our near-by sources of raw materials, of food, and other necessities of life, be not barred to us. Our very existence as a nation, as a people depends upon this assurance." The world applauded and has given Japan her chance to work out her destiny along these lines. It means, if anything at all, that Japan must have fair-play in which to develop her industries and find her markets in open competition with other nations. Any policy tending to deprive her of near-by sources of raw materials and food, must, in the end, drive her to fight once more for the right to exist. And it is our honest opinion that any propaganda that helps to bring about such a conflict by encouraging a combination of Russia, Germany and China to shut her off from these sources of supplies in Mongolia or Manchuria by handing over these territories to Russian exploitation, will merit the execration of the civilized world. Instead of isolating Japan, when the true facts are understood, it will bring world opinion as solidly behind her as it was in her previous struggle for existence. Northcliffe overlooks this.

What would honest British opinion say if the Japanese started a counter campaign and harked back to the days of 1898 and invited the world to remember the British ultimatum to China ? Would honest Britons relish such muckraking of the old diplomacy in order to discredit them in the eyes of the Chinese ? Would Northcliffe wish to have British prestige in China impaired by constant harping on the fact that the most important British railway concessions in this country were obtained in the identical manner as Japan secured her advantages under the twenty-one demands ? Would he not have to admit that his own government was actuated by the same reasons which prompted Japan seventeen years later to apply similar remedies in self-defense ? The British government still enjoys the fruits of that ultimatum, while Japan has surrendered what she forced from China, with the sole exception of the Liaotung lease, and even here, she is willing to follow the lead of Great Britain and France if they will forego the similar leases to Kowloon and Kwangchowwan.

Would Northcliffe dare to come out openly in his great newspaper, and advocate a square deal for China in designing and operating her own national system of railways, that China be permitted to develop the port of Canton in her own way so it will serve as the deep water outlet for the Canton-Hankow and the other projected lines of South China ? Until he can do this with a clear conscience, his attacks upon Japan savor of smug hypocrisy.

Responsibility for China's Militarism

Why does Mr. David Fraser, the Peking correspondent of *The Times* (now at home) take up the hymn of hate and blame Japan for China's militarism, because of the Nishihara loans to the Anfu clique ? Japan, he says in a recent article in *The Times*, "is rightly charged with being largely responsible for the militarism that is now the curse of China."

Would Mr. Fraser care to go back a few years and tell the truth about the reorganization loan ? Others have told it. That loan provided Yuan Shih-kai with the millions which turned him into a military despot, enabled him to build up the huge army in the North and create a military oligarchy which was employed to crush the growing germ of democracy in the South. Who placed the yoke of militarism upon China ? Who created the vampire oligarchy which in an unbroken line since Yuan, has fastened its claws upon China and sucked its life blood dry ? Yuan, Feng, Tuan, Chin, Hsu and now Wang, all the old gang of Peiyang militarists have held the reins of power by reason of their having been companions of a despot who broke the back of the republican movement in China through a loan that was not raised in Japan.

And let us be fair to those who forced through the re-organization loan against the repeated appeals of the South and go back, a few years more to 1909, when the new militarism was born in China through the imperial army program calling for 36 divisions (exclusive of the imperial guards of 30,000 men) of which eight were allocated to Peking and the metropolitan province, and, with the exception of the guards, under the direct command of Yuan Shih-kai. There was no talk at that time of Japan being responsible for this new departure, in fact, it was hailed as a sign of progress with all European powers intensely interested in a movement which provided unusual opportunities for the sale of arms, munitions, equipment and machinery for arsenals. At that time Japan was not a serious competitor in this field of modern industry. The impetus towards militarism came from an entirely different quarter, with Germany getting the lion's share of the orders for army equipment and Great Britain bagging the plums for the new navy. There was no criticism at that time about any one nation being responsible for China's new militarism, only the squabbles as to who would obtain the orders. Japan was not one of the squabblers.

Outside of Li Yuan-hung, from Chang Piao's southern army, and Chang Tso-lin, the bandit of Manchuria, the oligarchy of Peiyang generals (followers and sworn brothers of Yuan), have reigned supreme either directly or indirectly through their puppets. The power of the old Peiyang group has never been broken and when Yuan became dictator and was furnished funds from abroad which cemented his position, it became impossible to pry loose their hold on the nation. Japan was not responsible for the growth of the power of this clique. The responsibility rests squarely upon the shoulders of whoever was directly responsible for ignoring the protests of the Kuomintang and supplying Yuan Shih-kai with the 25,000,000 pounds sterling which enabled them to solidify their position, hound the parliamentarians out of Peking and give the *coup de grace* to the republican movement.

True, it is, that Japan loaned the millions during the war which enabled this flock of vampires to fatten themselves upon a helpless people, but it was not Japan who created and made the situation possible. Would Mr. David Fraser have us believe that as long as the British government favored and supported the military despotism of Yuan that the world should applaud, but when Japan carried on during the war and loaned the funds so the system might be perpetuated, that she is to be held up to the bar of world opinion as solely responsible for the present situation ? Japan may have been responsible for prolonging the system, but she did not create it. Why, then, pick on Japan ?

The Story of "The Two Japans"

Northcliffe continues to harp on the threadbare story of the "Two Japans," in which the militarists are censured for their failure to live up to treaties entered into by the responsible government. This story has served its purpose in the same manner as it was employed to turn world opinion against Germany. The Japanese have been quick to sense where all this hostile propaganda was leading the nation. Sure, there are two Japans, as there are two Americas, a double-faced Britain and a Jeckyl and Hyde France, which takes the form of a constant conflict of opinions between the civil and military authorities in order to hold the reins of power, wherever an army of occupation in a conquered or occupied country in essential to stability. It is superfluous to cite incidents in support of this statement.

In this respect there are two Britains, and in like manner we have two distinct cleavages in present-day France, where for the moment the military are on top dictating the policy of the government. In America, in Great Britain, in France, as elsewhere, the militarists justify their flouting of the civil power on the high grounds that national or imperial defense imposes this duty upon them, that the civil authorities have no conception of how to treat subject peoples who accept all concessions as a confession of weakness. And here they differ in no respect from the Japanese militarists who insist that had they relaxed their vigilance and handed over full control of the government to the cabinet, the nation would have fallen a prey to some stronger predatory power.

It is correct to say that there have been two Japans; it may be that the power of the militarists still endures, but it is also a fact patent to all impartial observers, that the Japanese militarists have had their day and from now on the policy of the government will be dictated by the business element. It certainly will not strengthen their hands or forward the cause of liberalism in Japan to start anew a propaganda against the militarists. If Japan is to fall into line with the nations of the West, her liberals must receive support, sympathy and encouragement. To reopen a dead issue, in order to discredit their nation and hamper its legitimate trade aspirations is certainly not conducive to amicable relations or harmonious co-operation. Give the liberals and business-men of Japan their chance. They can be depended upon to put their militarists in their proper place if not nagged and ragged by unfriendly foreign criticism. To those who persist in holding up the picture of the "Two Japans" as proof of the existence of a dual government in that empire, it might be well if they read more carefully the current history of other nations. They would perhaps become convinced that they themselves were dwelling in very conspicuous glass houses. Why throw stones at Japan ?

Japanese Propaganda

Northcliffe then comes back to the worn out fable about Japanese propaganda and says :

> "When calling attention to any matter that affects Japan we have always to remember that hourly, daily, weekly—morning, noon, and night—Japanese propaganda is at work in the form of bribed newspapers, propaganda news agencies, propaganda plays and propaganda films, and that quite a considerable amount of this propaganda has been widely diffused in Great Britain and the United States."
>
> "The controller of a Far Eastern news agency said to me: "I had some experience of the German propaganda before the war, but the Germans are infants in arms in comparison with the Japanese." That was also my own personal experience."

This makes most interesting reading. Now let us analyze it and keep in mind other pertinent facts. Northcliffe concurs that in the matter of propaganda the Germans are infants in arms in comparison with the Japanese. That is a tall statement. During the war the allies got together and expended many millions ($12,000,000 by America alone) to counteract the German propaganda. They succeeded. The Germans afterwards very frankly admitted that their *moralé* was broken and allied victory made possible because the latter outdid them in publicity methods. Again, unless our memory plays us false, the Germans also very candidly admitted that the British publicity system was the most effective. At the head of Britain's publicity organization stood the owner of *The Times*. If this be true, then Foch, Pershing, Haig and Diaz are overshadowed by the real hero of the war, the master mind of British propaganda, Viscount Northcliffe.

Yet here we have the king of British propaganda handing over his crown and scepter to some obscure person in Japan. Now, it stands to reason that wherever organized propaganda exists there must be some directing genius, who sounds the key-note for the agents of the system to work to. Yet Viscount Northcliffe fails to enlighten his readers as to the identity of this personage. Who is the master-mind that directs this brilliant Japanese propaganda ? He certainly is not British. Neither is he American. No editor of a foreign newspaper in Japan can lay claim to this honor which places him head and shoulders above Northcliffe. Who, then amongst the Japanese, has risen to a height where he outshines Hearst in America and Northcliffe in England ?

The time has arrived when the world demands something more than mere inuendo. What are the names of the bribed newspapers, the propaganda news agencies, the paid writers of the system which menaces the prestige of Northcliffe and his own organization ? Come out into the open, talk facts and give the Japanese a chance to defend themselves. It is easy enough to be a successful propagandist and sway the opinion of the English-speaking world when one owns the most important daily papers in the world. It is easy enough to damn a nation and a people, when they cannot answer back, when they have no press or mediums through which to present their views to the same audience.

There was some explanation to be found for the recent anti-Japanese campaign conducted by Americans; there is no good or sufficient reason to account for Northcliffe's outburst against Japan. Knowing that Japan cannot reply in her own press and has no way to make her voice heard throughout the English-speaking world, it is our candid opinion that Viscount Northcliffe is taking an unfair advantage of a people staggering under a great handicap. It is contrary to all ethics of the game, to that spirit of fairplay and sportsmanship inherent in the British character to jump on Japan at a time when her liberal element is striving to fall into line with the ideals of the West. Japan is entitled to have her side of the case placed before the world, she is entitled to more consideration in this respect that any other large nation because of her inability to properly defend herself against these attacks, and she deserves special courtesies and advantages from the press of an ally whose highest officials bear cheerful testimony to her willingness to shoulder her full obligations during the late war.

There is another side to the story that Northcliffe tries to impress upon his readers. If there exists a propaganda in Japan, we have failed to discover it. The only Japanese propaganda we have been able to locate in fifteen years, is one which has for its object: peace, co-operation, harmony and understanding between Japan and the United States.

Why Kick a Dead Horse?

It is not difficult to understand the trend of Northcliffe's propaganda. It is also easy to understand that it is his own fight; that he does not faithfully reflect the views of his government, or the bulk of British opinion. Northcliffe is probably accurately informed that public opinion in the United States is satiated with this persistent and unreasonable campaign to incite national hatreds, racial antipathies and provoke trouble. American opinion is aroused as it never was before. Our leading statesmen are openly advocating that the purveyors of false news be deprived of their citizenship, and it is not at all improbable that an official investigation will be made to probe into these movements and discover their real instigators.

In the welter of Far Eastern propaganda and the keen struggle to dominate the Chinese government and influence business for contending nationalities, it is sometimes difficult to speak for a whole community. But we can safely state on behalf of the entire international commercial community in Shanghai that the continuance of propaganda of the character now sponsored by Viscount Northcliffe can bring no permanent or beneficial results to those who must seek their future in this country. Business in China calls loudly for a respite from these acute campaigns directed against friendly nations. We need peace, harmony, co-operation and consideration for the other fellow's problems and troubles. We are all in the same boat in China. There is no nation entitled to accuse another of taking advantage of China, for the purpose of ingratiating itself with the Chinese. The Japanese may sport no halo, but there exists no empty pedestal erected to the savior of China, that any nation has the right to preempt. The line with bricks now forming behind Northcliffe and his lieutenants for throwing at Japan might be better employing in erecting an enduring edifice of international good-will.

The world will probably heed the warning of Northcliffe, and Watch Japan, but it will also Watch Northcliffe, and scan very closely the propaganda that is simply a revamp of old stuff that was forgotten at Washington. Why kick a dead horse, Northcliffe?

The Soviet's Holy War Against Britain

We invite attention to a little book just published by the Macmillan Company, entitled "*Russia in the Far East*" from the [illegible] of Leo Paslovsky. In this book we read as follows:

At the third international congress held at Baku in September, 1920, Zinoviev laid down the most important of the fundamental theses of the whole policy and program of communism in Asia. In his own words this policy is: "We are ready to support any revolutionary struggle against Great Britain . . ." The watchword under which this struggle was to be carried on was presented by him to the congress in the following form: "Declare a holy war against European imperialism, particularly against Great Britain."

Has Zinoviev's campaign progressed in the past eighteen months? Let British interests in China answer this for themselves. The facts should warn Northcliffe and his advisers that in denouncing Japan and playing hand in glove with Bolshevist agents, instead of enhancing British prestige in China they are acting as the pliant tools of a system whose ultimate object is the overthrow of British dominion in Asia.

This interesting and timely book also very tritely explains the Soviet policy towards China and Mongolia, making quite clear that while Russian propaganda is directed against Japan's continued occupation of Eastern Siberia, the Soviet is steadily absorbing the vast territory of Mongolia, doing unto China exactly what they bitterly denounce in Japan.

Bringing Japan and America Together

The opinions expressed by a section of the British press testifies to the adoption of an extreme pro-German policy and we find the *Manchester Guardian* jubilant over the cooling of British sympathy for Japan. This influences the *Tokyo Nichi Nichi* to remark:

> "To rely on a country in case of need and put a slight on it when its help is not necessary has, it seems, become the common-place thing in the world's diplomatic circles. We cannot, of course, foretell how long the intimate relations between the United States and Great Britain will continue. But there is no knowing whether the two countries will not meet with the same experience as Great Britain and Japan has had since the severing of the bond of alliance.
>
> "Perhaps history will repeat itself in the case of the Anglo-American friendship. Be that as it may, the preposterous sacrifices and concessions made by Japan have furnished the United States and Britain with unexpectedly great successes and satisfaction, diplomatically and strategically. In other words, what has cost Japan so dearly has promoted the friendship between the United States and Great Britain and dampened the cordial sentiments of the British people for Japan. What little Japan has gained at the conference is the establishment of good understanding between her and the United States. If the peace of the Pacific be preserved and maintained by the two countries, their friendliness and amity will grow more and more in the future.
>
> "And, in the sense, Japan and the United States will come to be bound together either spiritually or materially and contribute immensely to the safeguarding of world peace and elevation of the status of human civilization and culture. The Japanese people who have been disappointed at the results of the conference had better entertain optimism for their future in the face of these fine and rosy prospects."

The *Nichi Nichi* is right. The picture painted by Northcliffe bears the imprint of a system familiar to impartial observers in this part of the world. America and Great Britain will remain close friends and allies, exerting their great influence and power for world peace and uplift. Japan has been brought into this new understanding for the preservation of our common policies in Eastern Asia. She will not fail her partners. Despite the vigorous campaign of Northcliffe for the abrogation of the Anglo-Japanese alliance, the British government lived up to the highest ideals of international honor in refusing to throw over Japan and isolate her until another satisfactory understanding was arrived at to take its place. Any attempt at this time to prolong the agitation against Japan will only defeat its object. The continuance of such an unwarranted and untimely campaign will tend to draw America and Japan closer together in a more perfect understanding. The "King of Propaganda" should realize this.

Geo. Bronson Rea.

River Conservancy in China

AN ANALYSIS OF COSTS

By Laurence Impey, C.E., A.M.I.M. & County Engrs.

THOSE who read my article on River Conservancy Work in the May number of THE FAR EASTERN REVIEW may perhaps be interested in a more detailed account of the work, together with some estimates as to costs.

The map appended shows one of the most dangerous stretches of dyke on the whole of the Han River, in my opinion, and I have had an opportunity of observing the work at the other places up and down stream fairly recently.

The figures I shall give will be taken from the work at Sze Tze Kow more particularly, as I can cost the accounts there more readily, and the work has a resident engineer, not being under a Chinese of the old regimé as it is at San Kuan Miao.

The total distance covered by the map, from the quarry above Anlu down to San Kuan Miao is divided as follows: Quarry to Anlufu, 5 miles, Anlufu to Sze Tze Kow, 10 miles, Sze Tze Kow to San Kuan Miao, 20 miles, a total distance of 35 miles.

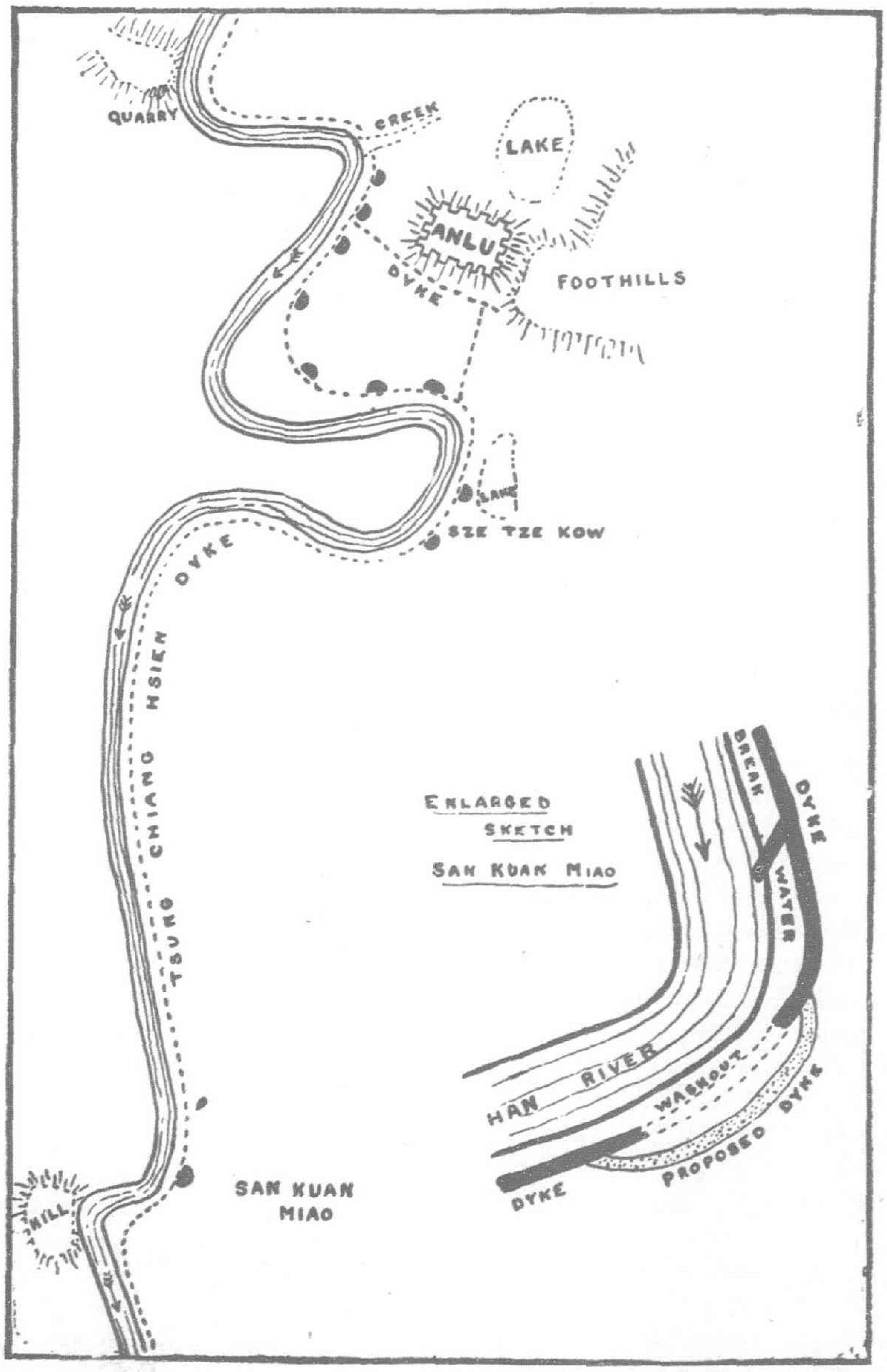
It must be remembered that the quarry on the map is not the one from whence the stone for the work is obtained, that comes from a hill 14 miles further on.

The reason for the disuse of the first quarry is, I think, to be found in the old Chinese superstition anent "*feng shui,*" as underneath the hill is reputed to lie coiled a dragon which it were disastrous to disturb, and therefore some perfectly good stone is wasted, and the cost of the work considerably increased.

This hill, however, plays an important part in the formation of the course of the river, as it diverts the current at right angles and sends it crashing down upon the dyke just north of Anlufu, with results that are easily imagined.

The dyke was broken in over twenty places last year, between Anlu and Sze Tze Kow, and only the secondary dyke shown on the map saved a great disaster.

As it was, the water inundated the area north of the city until it was held in check by the high ground and walls of the city on the one hand, and the foothills on the other.



Han River Conservancy: Anlu-Sze Tse Kow-San Kuan Miao Dyke Works

A lake and a creek are the only souvenirs, now that the flood has receded, for the gaps in the dyke are practically all repaired now, mostly by local endeavor, together with a grant from the famine relief committee.

Formerly the river ran below the walls of the city of Anlu itself, but for various reasons it has receded year by year, until at present it is no less than eight *li* (nearly three miles) away.

It is noticeable that all the breaks occur at the end of a stretch of water, where a sharp bend in the course of the river causes it to exert enormous pressure against the dyke at such a spot; and I think I am safe in saying that this has proved the rule over the whole distance of three hundred miles from Anlufu to Hankow.

As fast as the river wears away one bank, it accumulates sand on the other, thus silting up the old channel, a state of things that only a dredger could remedy.

In passing, I would mention one curious phenomena which we have just observed, which is that whenever the freshets from the hills cause the river level to rise the sand bars seem to rise also, with the result that our steamer gets practically no advantage from a rise in water level of perhaps eighteen inches.

I dealt last time with the emergency methods which we were employing to repair the dyke, and I would call your attention to the custom of old time as exemplified in the work done by the Chinese at San Kuan Miao this year.

The break, as illustrated in the rough sketch, may be said to have been caused by a combination of circumstances.

Firstly, you have the rush of a large volume of water bearing down on the dyke with a direct impact which it is not sufficiently well protected to withstand.

Secondly, there has been constructed a breakwater, some hundred yards above the washout, with the result that a dangerous eddy was formed, which probably did more damage in undermining the toe of the dyke than did the direct impact itself.

Within the break the new dyke, called by the Chinese a "*yueh tee,*" has been built, a method which they seem invariably to adopt, but which would not commend itself to engineering practice elsewhere.

It is certainly much cheaper and easier to build in every way, the other method requiring good foundations and piling, together with rock facing ; but while one results in keeping the course of the river as clear and straight as possible, the other involves it more and more for every fresh break.

I am not able to quote any Chinese conservancy accounts from first hand auditing, but I append below the expenditures at Sze Tze Kow and other places under the famine relief commission roughly analysed.

Expenditures.	Per cent of Cost.	Notes.
Piles	20.8	ex Hankow.
Wire	.8	,, ,,
Rock	23.3	ex Quarry.
Earth	25.0	
Sand	16.6	
Salaries and wages	4.2	Engineers, Accounts, Foremen.
Extra labor ..	.9	
Pile driving ..	3.4	
Bamboos	4.2	
Sandbags	.4	
Expenses, overhead	.4	
	100.0	

I purpose to give a few particulars as to the various items, the sources and application, together with data as to employment of labor, and comparison with previous Chinese work would be very informing if the material were available.

The piles used on the work were shipped up from Hankow by junk, and cost Tiao 5.0 apiece delivered on the job.

They average thirty feet, and are cut for twenty-two-foot piles, or twenty-five-foot piles, the surplus timber being used for the five-foot base piles, the cost of cutting being borne by the contractor, and to be covered by the price of driving.

Driving of piles is paid per foot of penetration, the average cost per pile working out at 850 cash.

The driving of the small base piles and the wiring to the main piles costs 120 cash per set of two main piles and one base pile, with forth-five feet of wire.

Two methods of driving are employed, the usual one with a driver and iron monkey, the other, a sort of frame placed on the pile itself, on which the driving crew balance themselves, and the pile being pounded into place with a stone rammer.

The rock used is sandstone, no other being obtainable unfortunately, and has to be brought down stream in boats, some difficulty being caused owing to the fact that the boatmen all want to avoid this class of work, and have to be drafted by the district magistrate.

The price is contracted to include transportation, and is Tiao 7.0 per *fong*, measured on the job.

An interesting sidelight is thrown on the prices on previous work in this area by the comments of various contractors after a week's work.

Several of them came and complained that they were losing money, the prices being lower than those quoted above, and when I objected that the contract fixed a price, they replied that on the government jobs they had supplied, say, eight *fong* of rock, and been paid for ten ; or driven a pile five feet and been paid for eight, and cutoff the rest of the timber.

Earthwork was contracted on the same principles, the surplus being presumably divided between the contractor, the foremen, and the official in charge of the work.

Earth is costing about Tiao 3.0 per *fong*, and sand Tiao 2.0 per *fong*, the earth being brought in boats chiefly, and the sand carried in baskets and barrows.

Men, women and children are employed by the contractor, who uses a system of bamboo slips issued by his foremen for each load, and which are redeemable at the end of the day.

The price per load varies according to distance, from five cash to 15 cash being usual, and about 140 loads being carried to one *fong*, enabling a good worker to make 500 to 600 cash a day.

On the government work below men who are leaving tell me they could only make 200 to 300 cash per day.

Tamping and placing of earth is done by the contractor, in fact there is very little outlay on labor outside the ordinary contracts, some few coolies being used to place rock, and a few for extra wiring.

Bamboos are bought locally, and cost about 200 cash apiece, being bought by weight.

They are split into two or three pieces for weaving purposes, this costing 30 cash apiece, including splitting and placing, together with fastening down.

The Chinese system in the past has been to use bundles of reeds, but these rot very rapidly, though it remains to be seen how long the bamboos will withstand the wet either.

Sandbags have been purchased in large quantities, filled, and laid on the reverse of the dyke at the threatened points, in case the work does not progress sufficiently rapidly to enable it to be completed before the high water comes this year.

It must be remembered that the work has to be done with local labor, and that these men are farmers for the most part, who have to attend to their crops and planting at certain definite seasons, therefore it is very difficult to estimate on the amount of work that can be done in a given time.

The wages bill is small, as there work is contract work, and only four or five foremen and a storekeeper are necessary.

A Chinese accountant, a Chinese engineer, a foreigner supervising both, and the force is complete, with the exception of cooks and servants, a very minor item.

Money has to be brought up from Hankow periodically, so that the cost of a launch bearing money and supplies should be divided amongst the four or five jobs it serves.

It must be recognized that this is an emergency proposition, managed by amateurs, working against time, without proper preparation and the fore-thought necessary to the execution of such a project, and that it is also primarily intended as a famine relief measure, so that the usual surveys and engineering calculations are not available.

If this is remembered I hope and believe that some of the data may prove both useful and interesting.

New Harbor at Takoradi, Africa

The engineers responsible for the construction of the new harbor at Takoradi, Africa, have to face remarkably heavy excavations in rock, and to successfully undertake this work the use of mechanical excavators, of such rugged construction that they are capable of giving reliable and efficient service under very severe conditions, is essential.

It is eloquent testimony of British engineering that Ruston & Hornsby, Ltd., of Lincoln, have, in face of world competition, been instructed by the Crown agents for the colonies to supply three exceptionally heavy railway-type steam shovels to carry out the necessary excavations on this scheme.

These shovels are larger than any hitherto constructed in this country, the net weight of each being approximately 100 tons, bucket capacity $3\frac{1}{2}$ cubic yards, a full bucket representing 8 tons of rock.

Szechuan Developments

THE following is the scheme for a railway project by Gen. Yang Sen, which has been handed by him to foreign Consuls at Chungking.

I. Railway

(1) *Chungking-Chengtu.*—As a first step towards encouraging the development of China's largest and most wealthy province and with a view to providing sufficient employment for the people, and extending trade and commerce generally, all of which tend to the maintenance of peace, and to an adequate supply of the raw materials now required by the world, the Szechuan government proposes to construct a railway—in the famous Red Basin—from Chungking to Chengtu (about 300 miles) with a view to a future extension to Tachienlu, the gateway of Tibet, the world-famous treasury—about another 250 miles.

(2) *Gauge.*—In view of the fact that the cost of constructing a standard gauge railway over a hill country like Szechuan would be very great, it is proposed to build a narrow gauge line, say 1 metre, something similar to the lines laid down in Shanshi. This and other technical points are, of course, questions for decision by experts when the time comes, and need not, therefore, enter largely into an outline proposal such as this.

(3) *Probable Cost.*—At this initial stage it is also impossible to form an exact estimate of the probable cost of such a railway; but for the sake of negotiating a loan the figure may be temporarily put down at from twenty-five to thirty million taels. The final figure, however, to be settled when estimates have been prepared by experts.

Loan.—The terms and conditions of the proposed loan to be discussed when, and if the loan is negotiable, in the name of the Szechuan provincial government.

(4) *Traffic and Present Freight Costs.*—Traffic along the proposed route is enormous, and the amount of freight which the Szechuan people have already shown their willingness and ability to pay is probably higher than that prevailing in any part of the world. As an instance of this the steamer freights from Ichang to Chungking (about 500 miles) may be cited. The cost of freight over this 500 miles works out at from Tls. 70 to Tls. 100 per ton.

Again, the overland transportation charges of cargo from Chungking to Chengtu are, at present, about Tls. 130 per ton (about 40 tael cents per ton per mile) and the transportation by river between these two places is roughly about Taels 15 per ton, the cargo being six weeks *en route*, and often arriving damaged by water owing to frequent wrecks. From these figures, therefore, it is safe to estimate the railway freight charges for the entire journey, Chungking to Chengtu and *vice versâ*, at about Taels 20 per ton, or about six tael cents per ton per mile.

(5) *Possible Revenue.*—In considering the possible revenue to be derived from such a railway as is proposed, the development of the coal, salt, rice and sugar industries must be taken into account, as well as the immense traveling population, which would always insure a heavy passenger traffic. With peace once restored to the province there would at once be a general increase of native exports and foreign imports. Besides all this the railway itself would naturally lead to the development of many new industries which would all tend to increase the income of the railway.

It would seem, therefore, safe to estimate the capacity of the railway at about 3,000 tons per day. This would be equivalent to 12 trains per day of 250 tons loads (passenger and goods combined, also the intermediate traffic included in the calculation) up and down the whole length of the line. Thus reckoned the tonnage per annum would reach the million mark, yielding a revenue of 20,000,000 taels. Even, therefore, from such a cursory glance, it will be seen that a railway between Chungking and Chengtu would prove to be a most profitable concern.

II. Coal Mines

It is becoming clear, even to the ordinary man in Szechuan that no real development can take place in the province unless an abundant supply of cheap coal can be assured. Coal is the key to the success of any and every enterprise; without it no modern industry can be made successful.

Realizing this to be a fundamental truth, it is proposed that together with the construction of the railway there shall be started an official mining department whose aim shall be to develop the coal mines along the line on modern lines and methods. The said mining department is to be combined with the railway in a similar way as that which prevails in the case of the South Manchuria Company.

For this department the government proposes to raise a loan of one million taels.

The prospects for such a coal mining concern can hardly be exaggerated, and the advantages are obviously manifold:—

(1) The railway itself cannot be run without coal, and it would be a short-sighted policy to build any railway without first making sure of the coal supply.

(2) The ever-increasing fleet of high power steamers plying on the Upper Yangtze are such enormous consumers of coal that already it is being realized that the old-fashioned methods of producing coal are incapable of meeting the great demand of the Upper Yangtze steamer companies.

(3) The development of coal mines will greatly augment the traffic on the railway, and will always prove a sure source of revenue.

(4) With the introduction of railway transportation facilities the price of coal can be considerably reduced.

The extent of this reduction can be appreciated by a consideration of the fact that now from 70 per cent. to 80 per cent. of the price is absorbed by the present antiquated methods of transportation. It is self-evident, therefore, that with modern methods of production sales will greatly extend. The comforts of the people would rapidly increase, and every household in Szechuan would soon be a consumer of coal. The fact that, in an immense territory like Szechuan with a population of 70,000,000, there is not a single modern equipped coal mine, is sufficient to prove the success of such a mining department as the government proposes.

(5) The development of the coal mines along the line of railway would speedily result in the establishment of many industries equipped with modern machinery such as:—

> Sugar refineries, textile manufactories, cement works, salt refinery, indigo works, flour, oil and rice mills, extension of silk filatures, woolen factories, paper-making factories, glass-making factories, tanneries, brick and lime kilns, hydraulic stations, electric light, waterworks, etc. etc.

for all of which factories the Szechuan province is able to provide the necessary resources. With such a railway once running and all these industries established Szechuan would be on the way towards being one of the richest countries of the world.

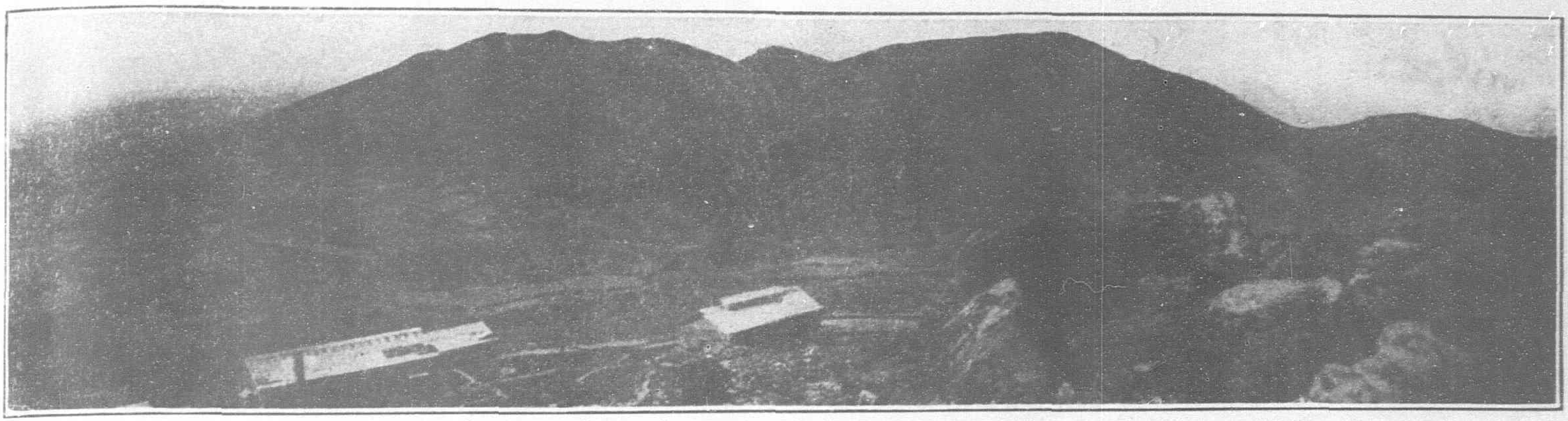
(6) The coal mines and the railway together with the consequent industries which will naturally follow, will more than supply work for the transportation laborers who may be affected by the introduction of the railway.

(7) Once the coal mines are well established other mines, such as iron, copper, silver, gold, mica, asbestos, antimony, mineral oil and spelter would soon follow for Szechuan possesses all these materials in great abundance.

(8) A daily output from the beginning of 1,500 tons of coal would mean half a million tons in the year. On this the profit realized would amount to Taels 750,000 calculating the profit at Taels 1.50 per ton. It is obvious, therefore, that the development and prosperity of Szechuan depends more upon coal than almost any other article.

The An-shan Iron Mine District, South Manchuria

By Hanzo Murakami, Geologist to the S.M.R. Co.

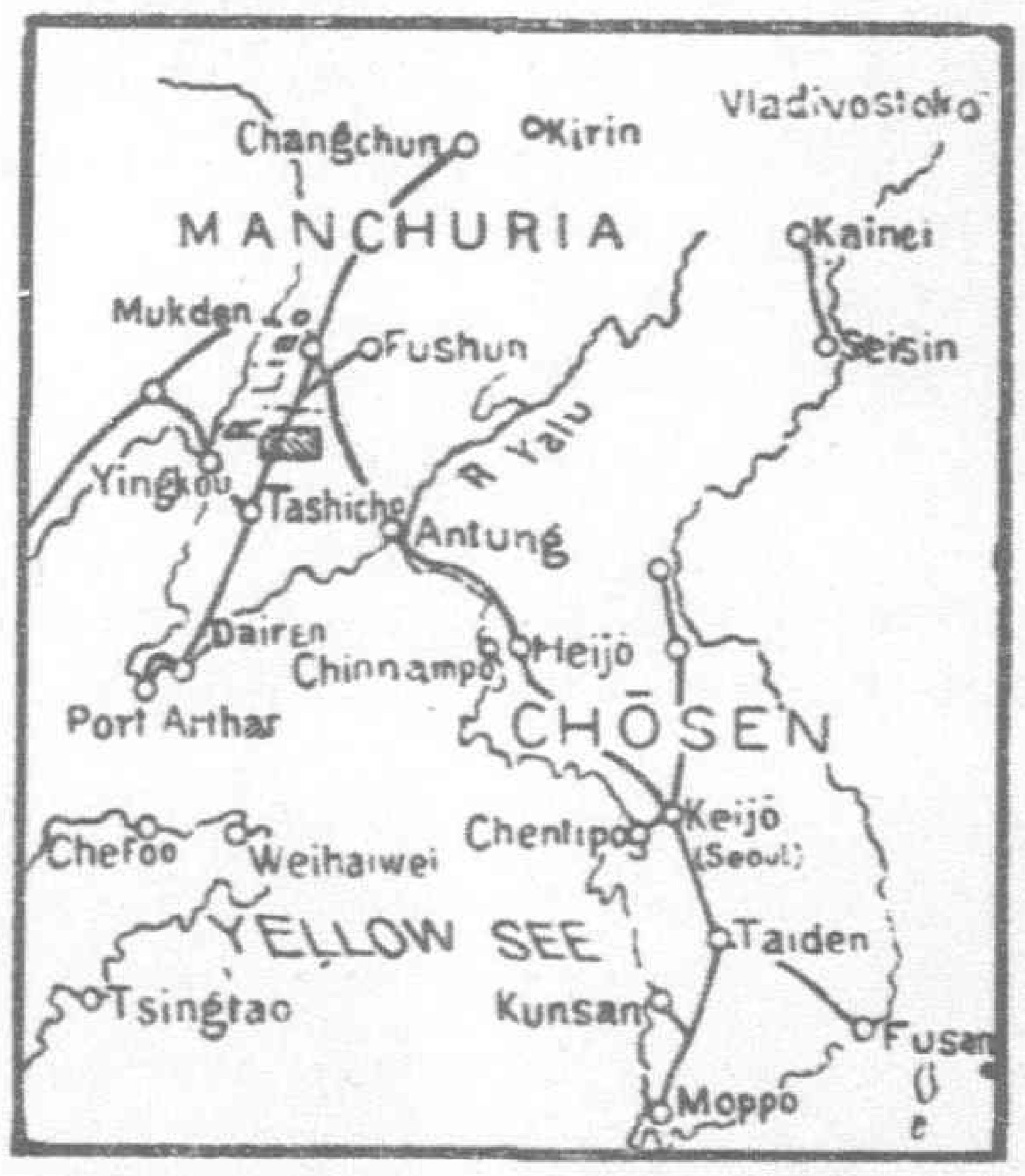


View showing the contact between the green schist and quartzite; the hematite-quartz-schist is not found there (Hsi-an-shan mine)

1. History of the Iron Ore Industry

THE Russians, when laying the railway from Harbin to Dalny (Port Arthur) had no inkling of the An-shan iron belt, in spite of the fact that the railway track crosses the middle of it, and on account of the low grade of "the iron-containing rock," they used it only for railway ballast.

In the year 1909, the geological survey conducted by the South Manchuria Railway Co. established the true value of iron ore at Tieh-shi-shan, literally meaning "the mountain of ironstone." Generally, the Chinese geographical names tell something about the geological peculiarity of the place. After the discovery of Tieh-shi-shan, this company continued to explore the district more and more, and had a delightful surprise at discovering the wonderful distribution of the iron; and now a fairly definite idea of the general distribution of the ore is known. This iron wealth lay neglected for a few years, partly because of the difficulty of acquiring the necessary concessions and partly because of the low economic value of the ore. During the war, the necessity for a local of iron in Japan was strongly recognized, and by May, 1919, two blast furnaces, with a capacity for 250 tons a day each, were completed in An-shan.



Map showing the location of the iron mine district of An-shan, South Manchuria. Shaded area indicates the iron district

When mining was started, it was astonishing to find many openings which no doubt once served as pits, excavated by primitive methods having a depth of about 60-ft. from the surface. Evidently this ore was mined in ancient times. It seems that the above depth was probably the maximum attainable, on account of the occurrence of water, bad ventilation, etc., when gunpowder or other modern devices were not available. Moreover, many pieces of old slag with charcoal and bones of mammals, employed for smelting purposes, were found.

From "The History of the Liao Dynasty, Vol. 60," written in Chinese, one may infer that the primitive mining above mentioned dates back about a thousand years, and that Tai-tsu, the founder of the Liao dynasty, took no little interest in mining work, especially in iron smelting, in the years 616-721, or in the Shen-tse era. It is recorded also that there was, at that time, a tax collector's office for levying taxes on the iron work at Liao-yang, 15 miles north of An-shan, known by the name of Tung-ching and that the tax was paid in iron produced.

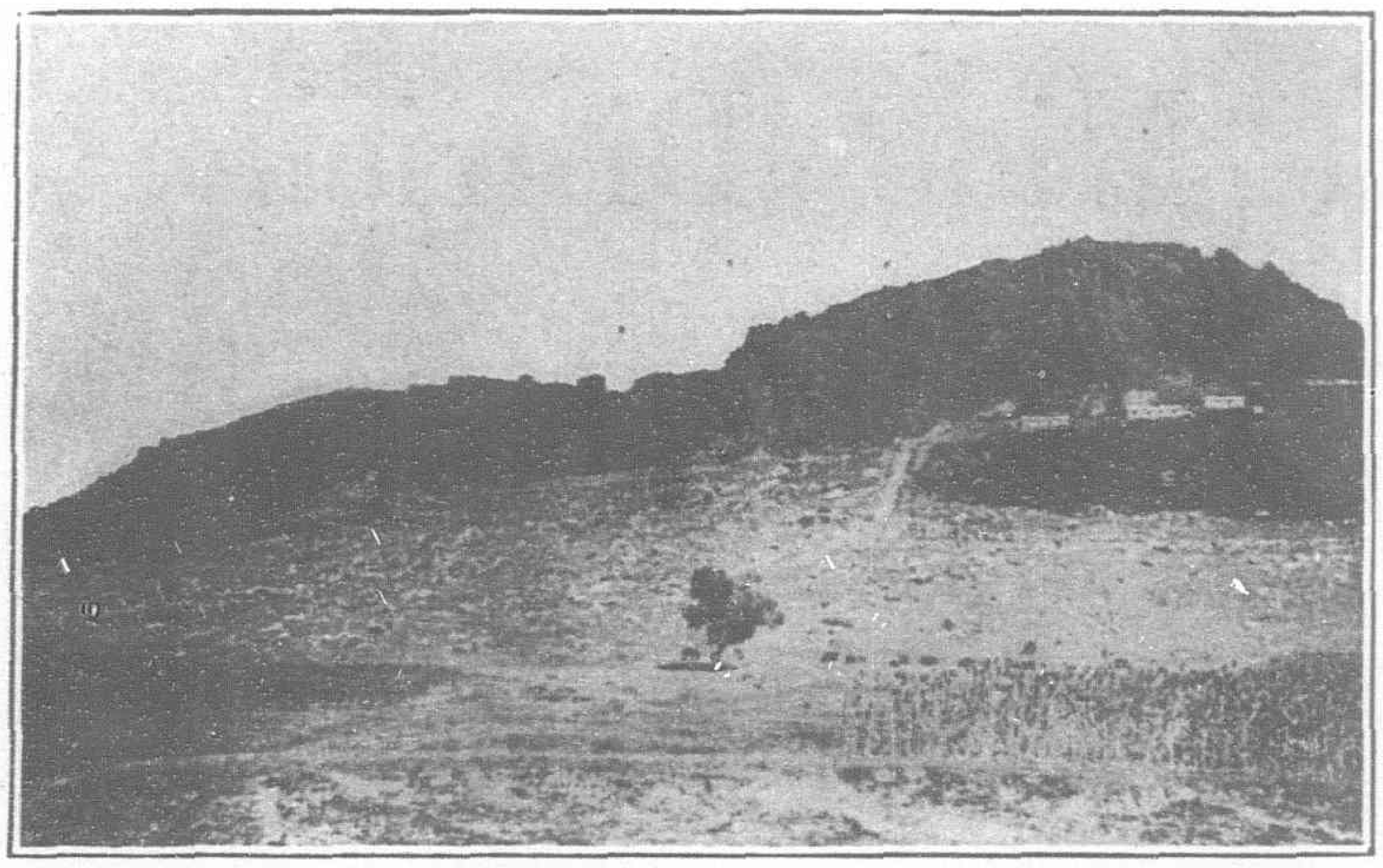
In this connection, on Shou-shan, 9 miles north of An-shan, popularly referred to by the natives as Shou-shan, because the Chinese character has the same pronunciation, a blast furnace was constructed, surrounded with about 300 houses for the residence of those engaged in smelting and mining industries. From these data, we may gather that the mining in the vicinity of An-shan was very prosperous in ancient times.

II Topography

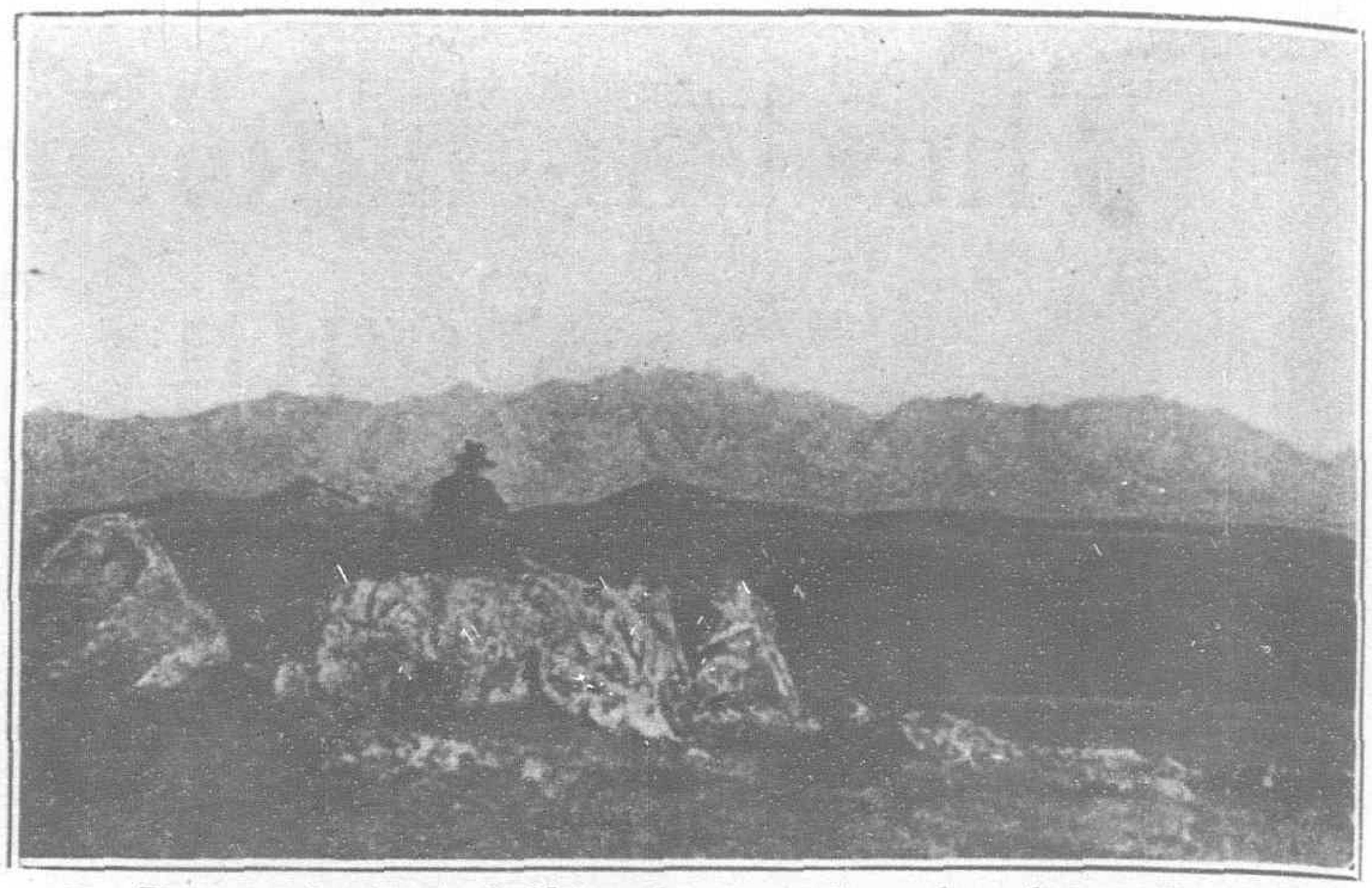
Any traveler who is going to Dairen southward from Mukden will find that the eastern side of the railway is a mountainous region, while the western side is an extensive plain with no remarkable mountains or hills. This is the reason why the railway runs along the great tectonic line through South Manchuria trending NE-SW, and the plain on the western part is the effect of the depression along the great fault and includes a wide lowland, through which the great river Liao runs. In the An-shan district, however, there are some traces of erosion relics even on the western side of the railway, though they are not remarkable when compared with the mountainous area in the eastern part of this district.

The geology of the An-shan district is comparatively old, because we cannot find any sedimentary or igneous rocks younger than the Cambrian. The crust has undergone severe denudation in the course of long ages. The present topography of the An-shan district has resulted, to a very large extent, from the differential erosion of rock formations, which offer varying resistance to the processes of degradation (Plate 1). The ridges, generally, tend to be flat-topped, and separating the various valleys from one another, they remain now the plateau of erosion or relic mountains. These uplands stand on the quaternary lowland just like an island in a great ocean.

Such a recent deposition as the glacial drift of the Lake Superior district in the United States of America, to which I have already



1. Typical view, showing differential erosion. The rock forming the cliff is the hard hematite-quartz-schist; while the slope is the soft green schist. The boundary between these two rocks is seen by a line in the figure.



2. Panoramic view of Chien-shan granite, taken from a detached hill, 6 kilometres to the west.

The characteristic features in the foreground can be easily distinguished from the formations of the range in the distance

alluded, cannot be found in the An-shan district, but we find some deposits of loess of æolian origin as the counterpart of the drift.

The exposures of the several formations are very distinct owing to the steep dips of the strata and the sparseness of the vegetation. This is very convenient, for field work and underground methods such as boring, are not required. The reason of the scarcity of vegetation in Manchuria is the ruthless deforesting and negligence in replanting rather than the aridness of the district: the precipitation in the year 1919 amounted to 429.5mm. in Dairen and 615.5mm. at Mukden.

The topography of the mountains can be classified into the four following types according to the structure of the rocks:—

(1) Chien-shan granites are distributed over the southern end of the district and develop abundantly in this direction, as may be seen on the map. They form, in general, erosion relics, the surface of which is more or less irregular, zigzag, ribbed and knotted. The height of the Chien-shan granites is estimated at about 550-600 metres above the level of the plain. The beautiful scenery of Chien-shan (Plate 2), commanding a view of the surrounding lowland of the Liao plain, was an object of veneration by the vatives from time immemorial, just like Mount Kongo (Diamond Mountain) in Korea.

(2) Hard and durable rocks, such as the hematite-quartz-schist and quartzite, stand out as mountains because of their persistence after erosion and denudation; the strike of the strata coincides more or less closely with that of the range. As seen on the geological map in this paper, these durable rocks are arranged so as to make a right-angled triangle with the railway as one of its sides; the average height of these mountains is about 200 metres above the plain.

(3) The gneissose granites rise to a height of over 200 metres. The distinction between the Chien-shan granite and the gneissose granite is that the ridges of the latter are flat-topped, being transformed into the undulating uplands. A study of such a plateau suggests to us that a chain of original mountains, after it has suffered much denudation, may afterwards again be uplifted to such a height as before (Plate 3).

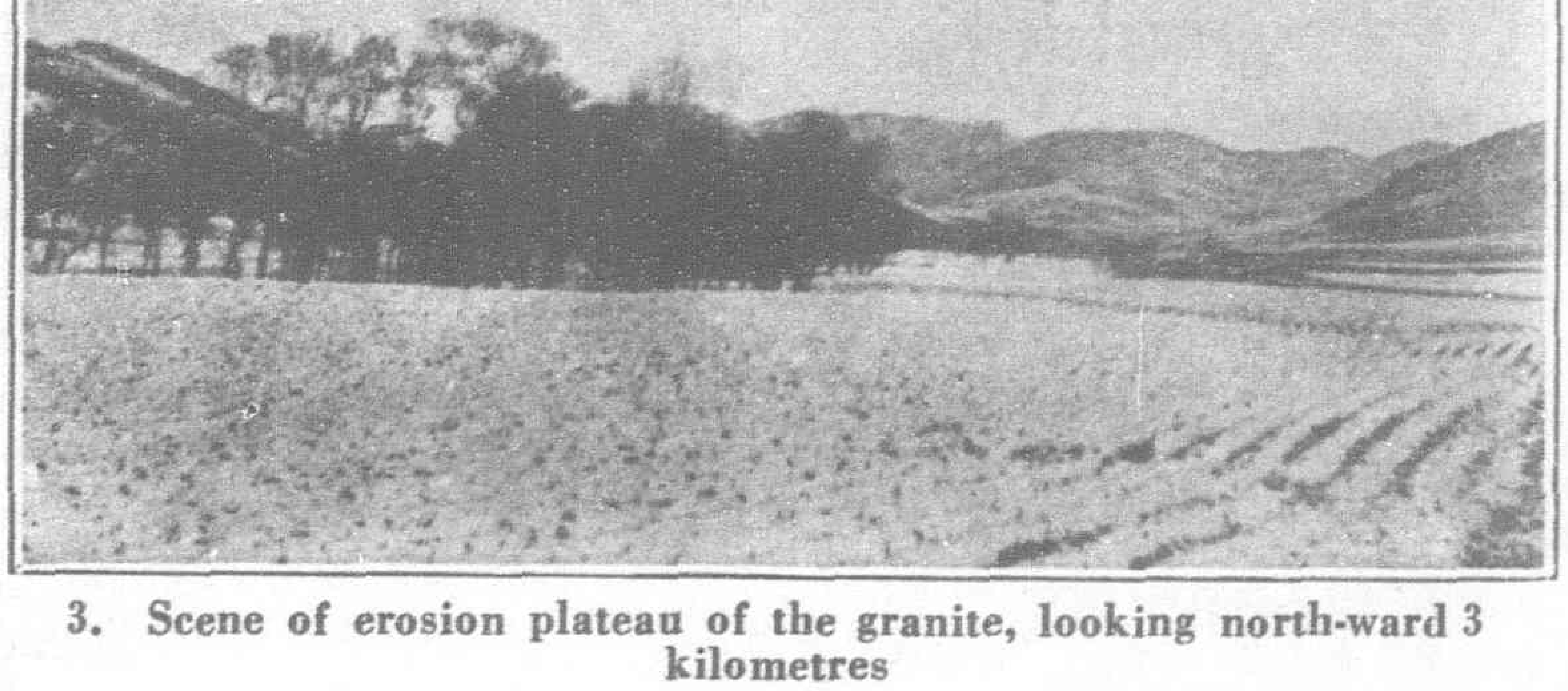
(4) In the course of long ages, the plateaus of granite pegmatite and other related rocks have suffered extensive denudation. They have been trenched and furrowed by many valleys to such a degree that they are hardly recognizable as table lands; their original plain-like character being nearly lost. They are transformed into regular ranges or irregular groups and masses of relic mountains. So the distribution and relation have been determined only by the nature and the attitude of the constituent rocks.

The drainage system in the district is comparatively simple. The Sha-ho or Chien-shan-ho in the northern part, and the An-shan-ho in the southern part, are the drainers of the district. Both rivers, after running westward for about 30 kilometres, make a typical meander and join the Hun-ho, which runs along south of Mukden and discharges into the great river, Liao-ho. Steep-sided valleys with many cliffs characterize these rivers. The formation of cliffs is probably due to several causes, such as concentrated rainfall, scarcity of vegetation and a surface deposit of very fine loess. It is recorded that at Dairen 64 rainy days occurred in the year 1919, and 73 days at Mukden in the same year.

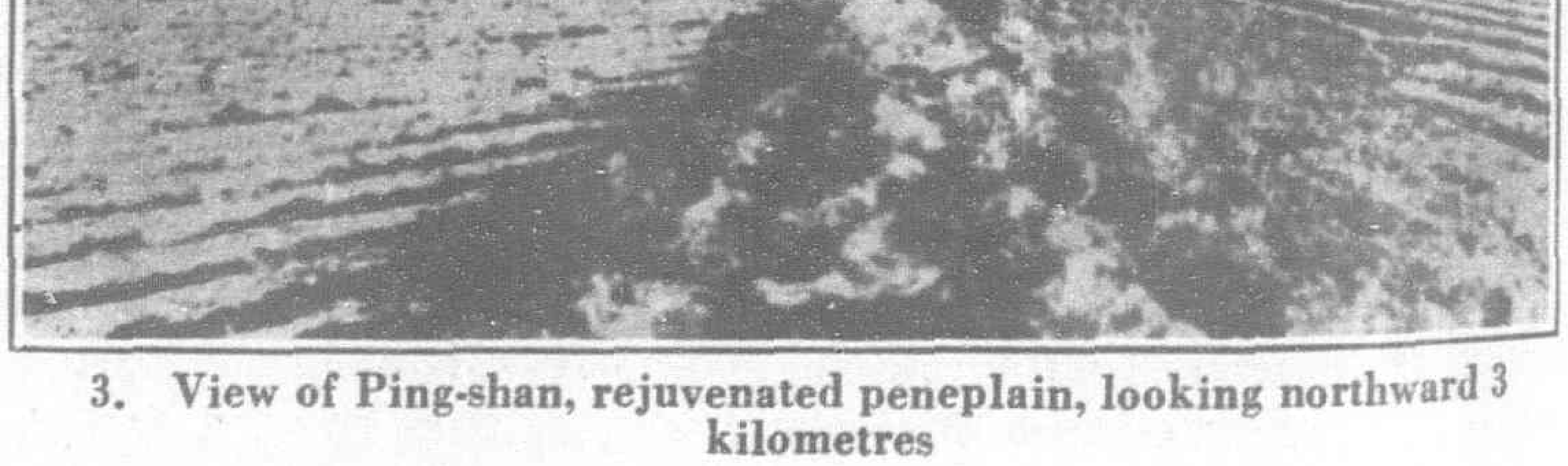
DETAILS OF EACH MINE

(1) Hsi-an-shan (West An-shan) Mine (Plates 4 and 5)

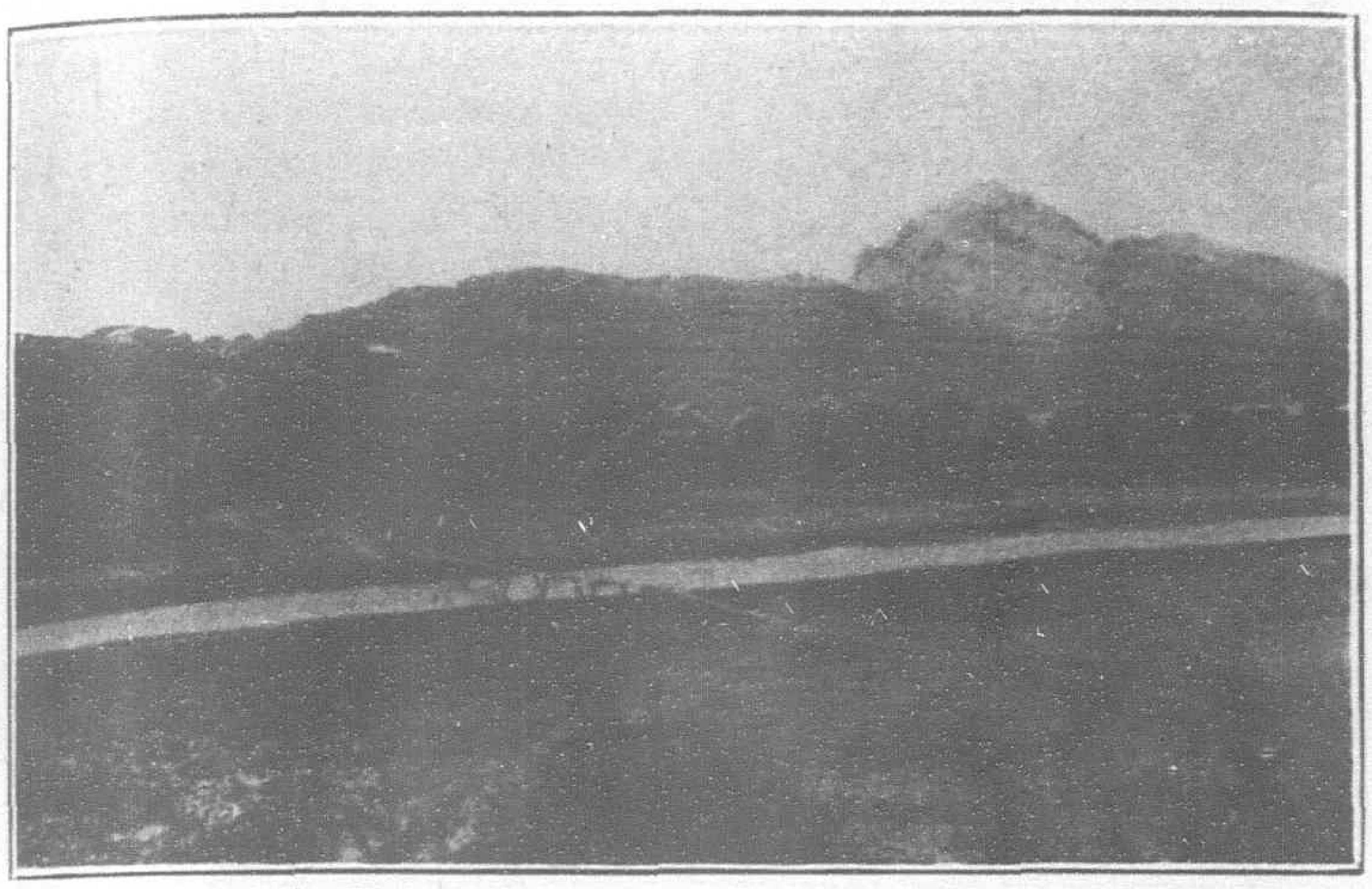
Hsi-an-shan mine is located between the station of Chien-shan and Tang-kang-tzu, being ouly one mile south of the former station.



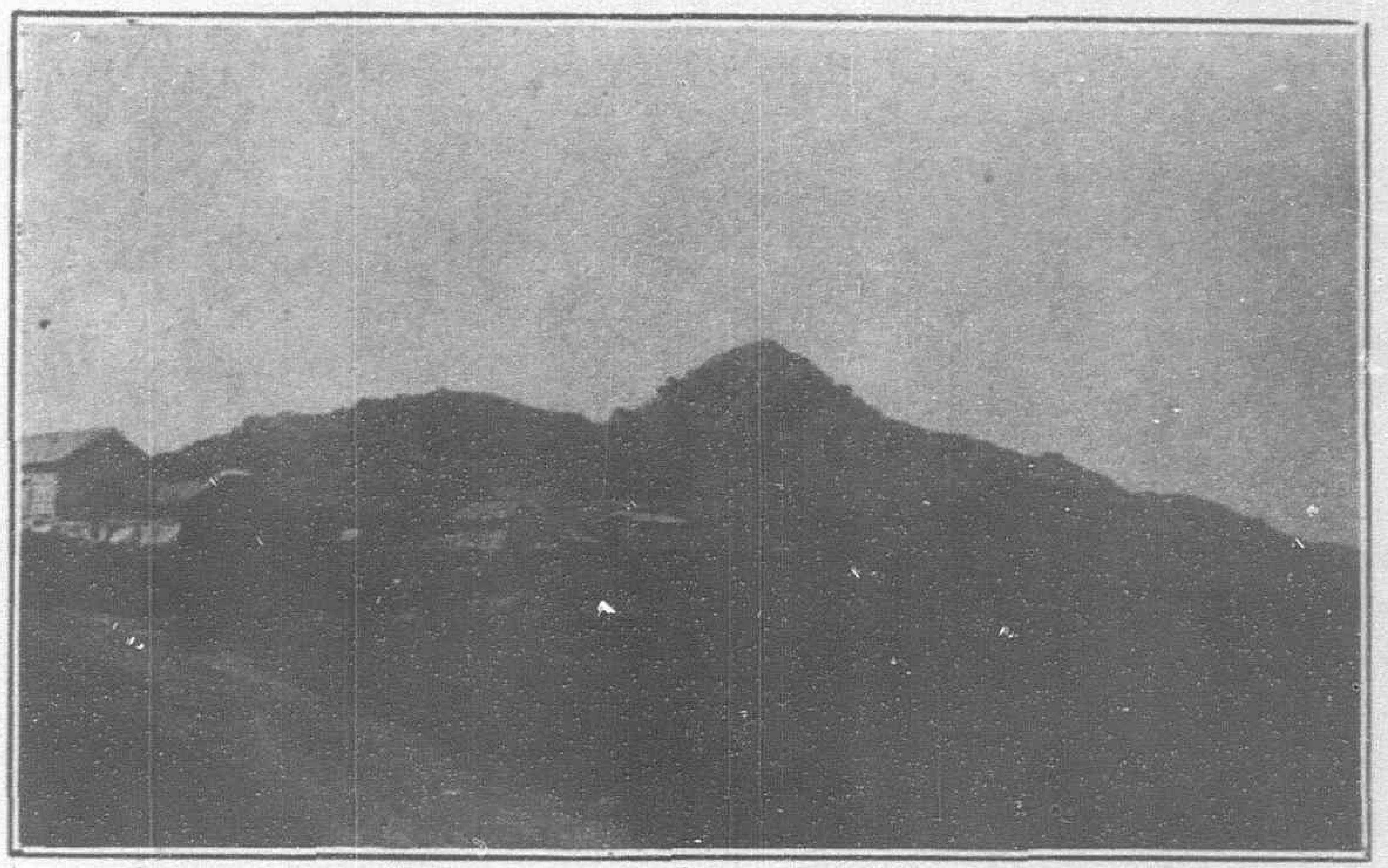
3. Scene of erosion plateau of the granite, looking north-ward 3 kilometres



3. View of Ping-shan, rejuvenated peneplain, looking northward 3 kilometres



4. View of the Hsi-an-shan mine, taken at a distance 1 kilometre northward. The river is the An-shan-ho



5. Peak, situated in the most eastern part of the Hsi-an-shan mine, taken from the northern slope

This is the most convenient location for the inspection of the An-shan iron deposits.

Although the highest peak is only 260 metres above the ground, Hsi-an-shan stands conspicuously with its characteristic features of rugged outlines, brought into higher relief amidst the surrounding lowland. The range is formed of three groups, the western, middle and eastern with the respective heights of 260,230 and 107 metres. They extend from east to west; the eastern end is cut by the river An-shan, along which the South Manchuria Railway and the main road run.

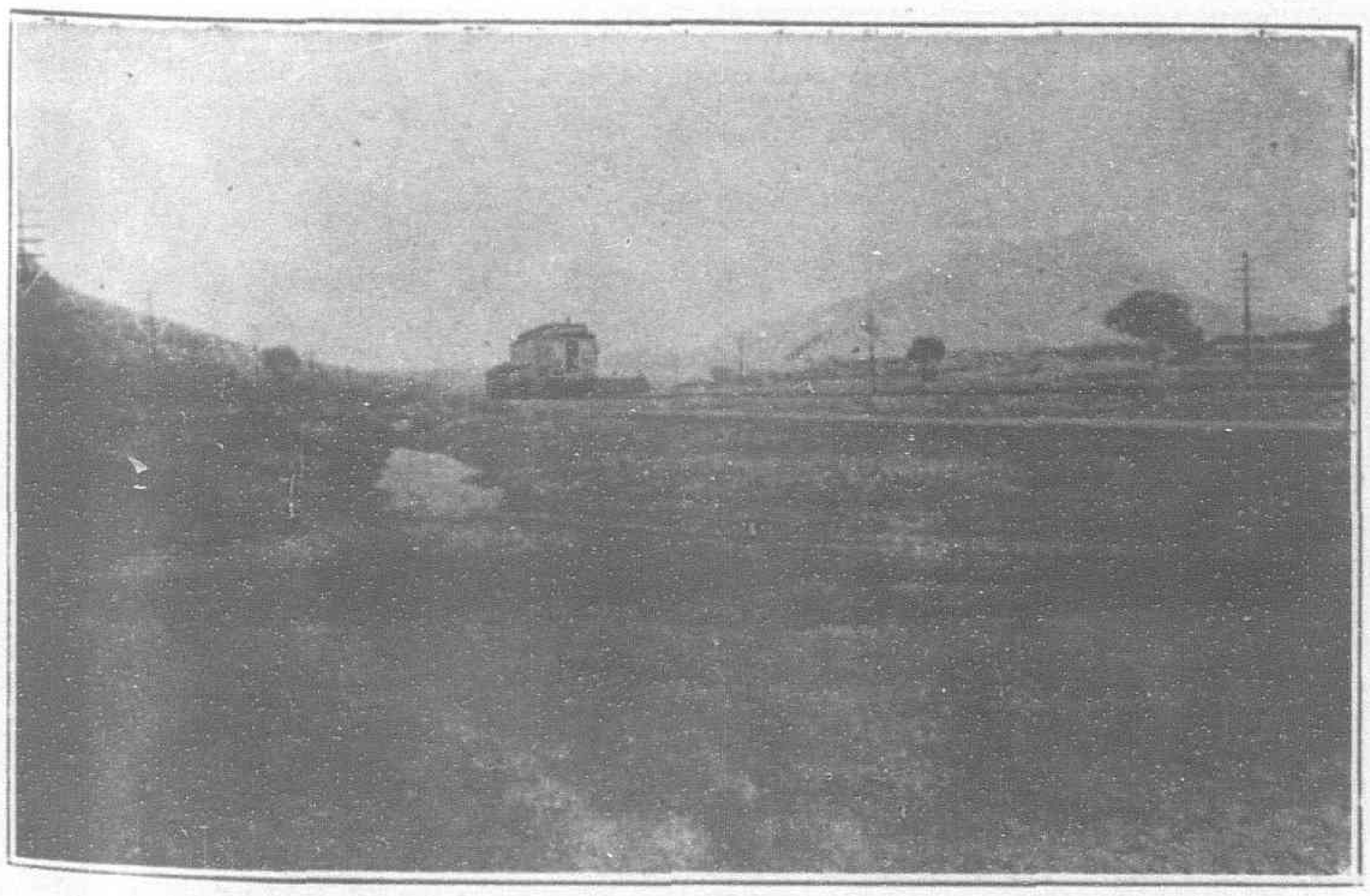
The prevailing rocks of the district are the green schist complex, hematite-quartz-schist, quartzite group and granite. The green schist complex consists mostly of slate, phyllite, sericite-schist, and talc-schist. The phyllite resembles in appearance a fine crinkled silk crêpe with undulating curvatures developed by severe dynamic pressure. Staurolite was probably once present, judging from a hollow looking just like a crow's foot. Sericite-shist and talc-schist are distributed locally near the zone of contact with the igneous rocks.

The hematite-quartz-schist controls the surface feature of the land, making an extremely rugged knob, due to its strong resistance against weathering. Its thickness measures generally above 40 metres. The quartzite group is made up of quartzite proper and siliceous slate, distributed widely on the northern side of the range and follows the slope of the surface. The quartzite frequently shows ripple marks and reveals the fact that it was formed in shallow water. Under the microscope, the rock shows general uniformity in size of quartz grain, and a nearly entire absence of any mineral other than quartz, except minute flecks of chlorite and magnetite. This purity is the result of sorting, which has caused the particles of other minerals to be removed, leaving only quartz grains. Secondary enlargements of the quartz grains are noticeable, under the microscope. Conglomerate measuring 0.15—0.3 metres in thickness overlies the hematite-quartz-schist; its fragments are angular hematite-quartz-schist and round grains of milky quartz, cemented by sandy hematite. On the lower northern slope, there are found the most recent deposits consisting of loess of a maximum thickness of 12 metres.

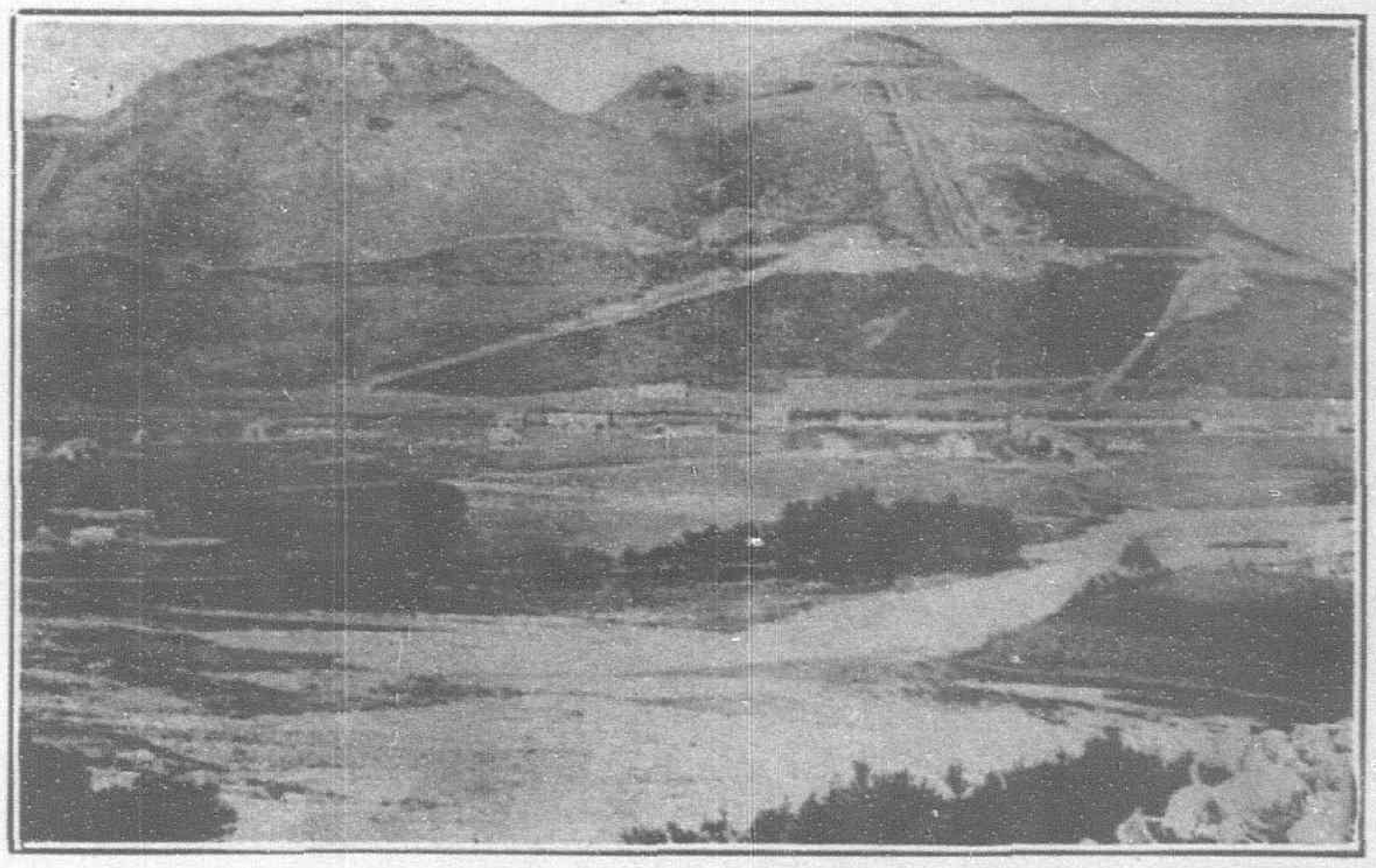
Granite is locally exposed on the southeastern slope of the range in contact with green schist. The prevailing minerals of the granite are pinc orthoclase, quartz and a small amount of muscobite. The granite shows more or less foliation, dipping to the north, and in it some quartz veins are exposed on the same slope. Some green schist in contact with the granite is metamorphosed to sericite-schist with much abundance of spotted quartz of 2-3mm. in size and the other is changed to conglomerate-schist which gives a minute aggregate of quartz and chloritoid with embedded quartz porphyritically.

Turning to the tectonics of the district, the great thickness of the green schist shows several undulations of the stratum with a gentle dip of from 10° to 30° and is conformably overlaid by the hematite-quartz-schist. The dip of the hematite-quartz-schist varies from 30° to 60°, underlying a thick seam of the quartzite, which gives generally a gentle dip of below 30°, and we can detect clearly the presence of unconformity between these two strata, judging from the occurrence of conglomerate, in addition to much difference in the dip angles. The contact metamorphic effect of the granitic intrusion into the green-schist is evidence of the early Cambrian age of the intrusive. The prevailing joint cracks in the hematite-quartz-schist are N 20°-30° E, dipping 60° southeast.

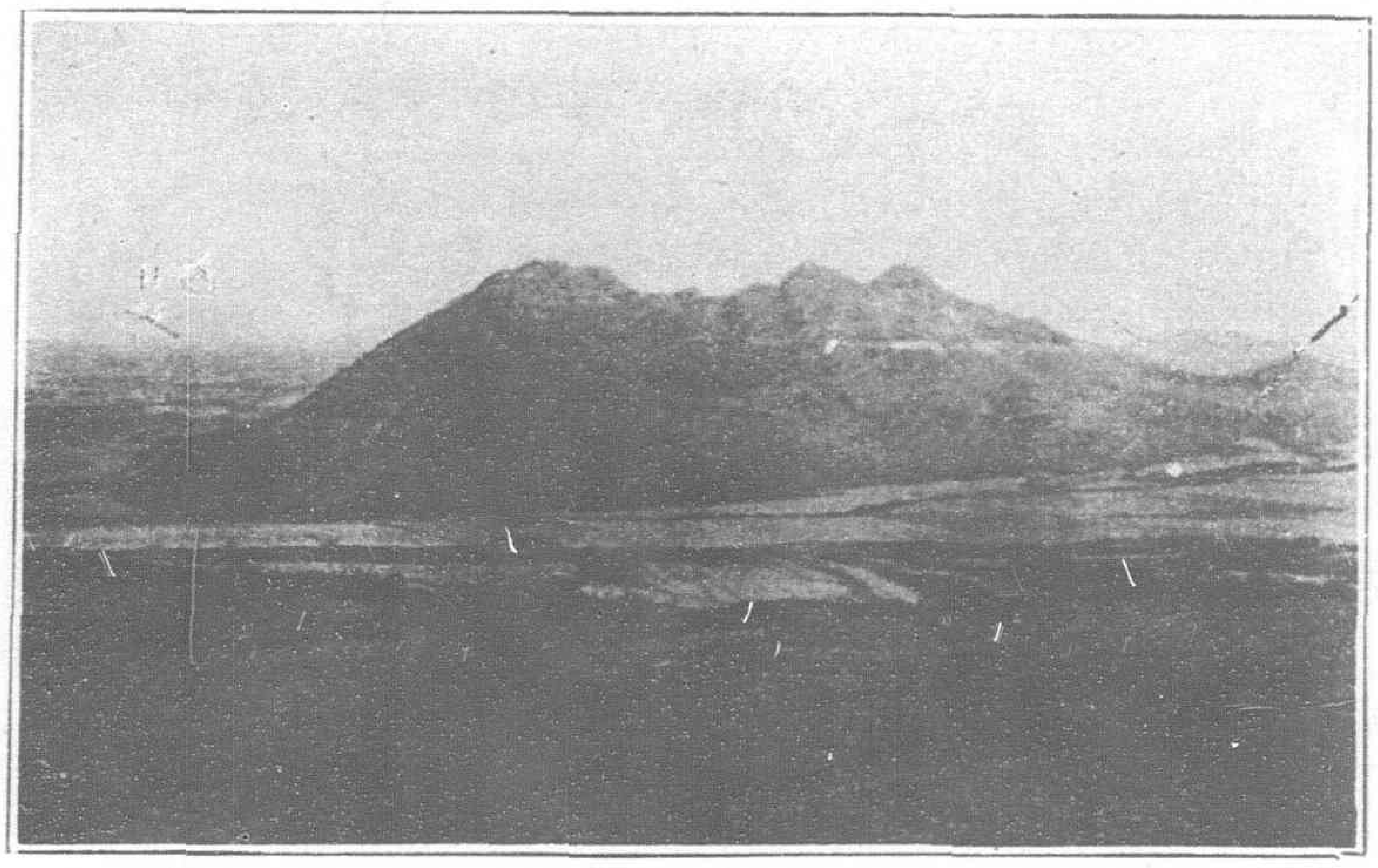
More or less high grade ore of primary origin has been worked in the eastern part of this mine, but the richer ore of the secondary origin is now much sought after. Some secondary ore has been found in the contact zone of the foot wall or hanging wall of the



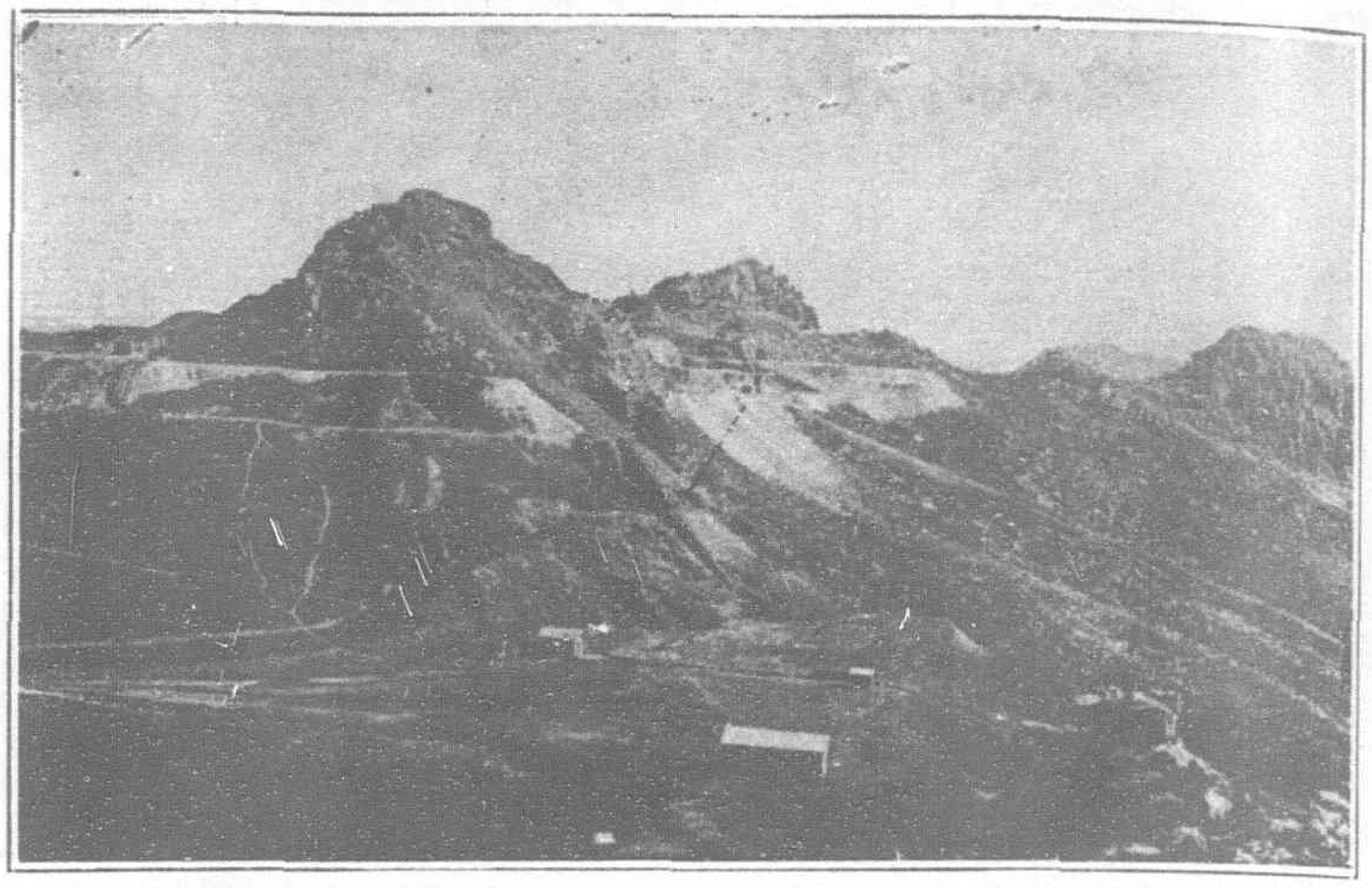
6. Southern view of Tung-an-shan (right-hand side) and Hsi-an-shan (left-hand side), being crossed by the main line of the South Manchuria Railway Co. as seen from a distance 4 kilometres southward



7. Southern view of the Ta-ku-shan mine, as seen from a detached hill, 1.5 kilometres west



8. View of the Ying-tao-yuan mine, looking westward from a granite hill



9. Open work of the Ying-tao-yuan mine; only the enriched parts being mined, looking southward from No. 1 pit

hematite-quartz-schist, that is, on the green-schist or under the quartzite, forming the platy veins with an average width of 2 metres, but frequently pinching and swelling. Recently, it is reported that at the western end of the district, they have found rich ores formed in gashes of the hematite-quartz-schist, due to the great flexture.

2. Tung-an-shan (East An-shan) Mine (Plate 6)

Tung-an-shan mine is located adjacent to and east of the Hsi-an-shan mine and is cut at almost right angles by the river An-shan. The highest point of the Tung-an-shan is about 330 metres above the sea level, and it presents a commanding appearance in comparison with the surrounding level plains. From the top, one ridge runs northwest, and another eastward, and the southern slope of the mountain is generally steeper than the northern, this being due to the difference of the constituting rocks.

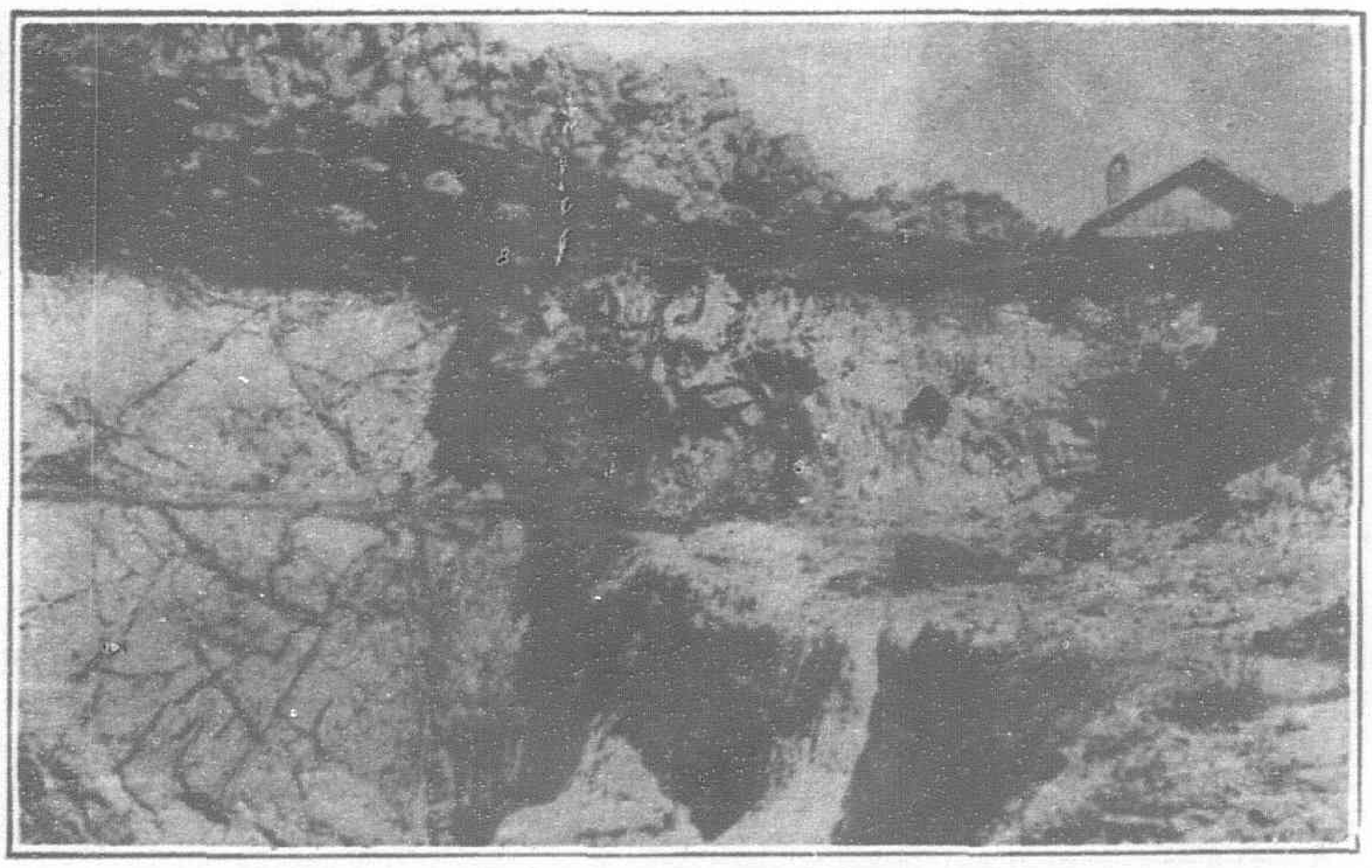
The main rocks are green-schist, hematite-quartz-schist, conglomerate, siliceous slate, quartzite in sedimentaries and granite in igneous rock. The green-schist complex are made up of sericite-schist and phyllite exposed in the higher parts of the southern and southwestern slopes of the mountain. The hematite-quartz-schist stands out on the prominent ridge; its position being due to its great resistance to weathering, and it is not difficult to distinguish its boundaries from other rocks, but at the east end, the quartzite overlies the hematite-quartz-schist making it difficult to tell the boundary.

The hematite-quartz-schist of the Tung-an-shan mine possesses greater fissility than that of the Hsi-an-shan. The conglomerate is well exposed and has commonly a width of 0.3 metres, but on the eastern cliff of the highest point, it swells locally to 2 metres and is frequently worked, because it contains iron to an extent worth tapping. The pebbles in the conglomerate are the round grains of secondary quartz and fragments of the hematite-quartz-schist cemented with the iron oxide in the form of alluvial sand. It is noteworthy to find talus deposits of the hematite-quartz-schist in the northeastern slope of the highest point, and some of them are mined as ore.

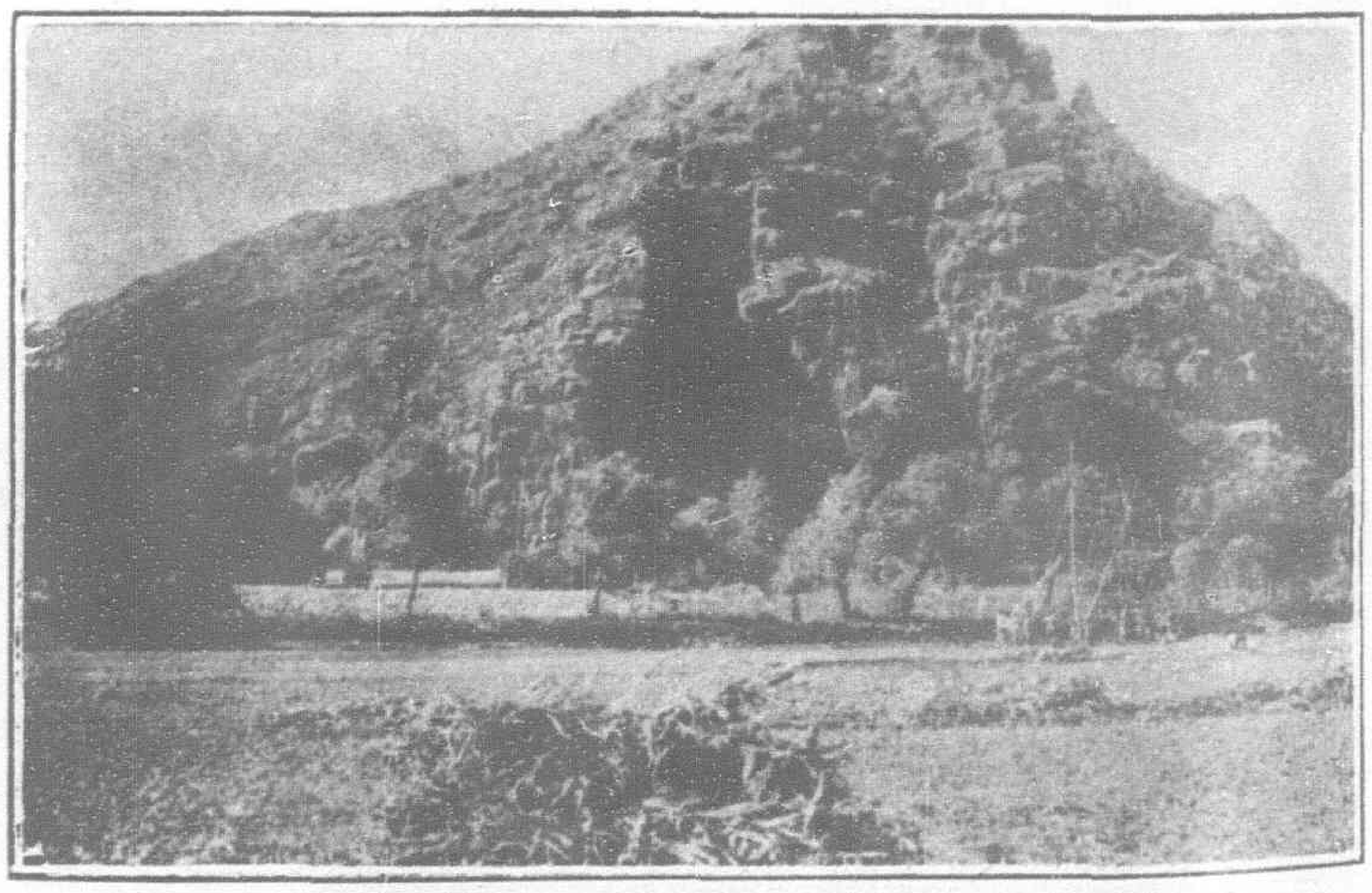
As a Cambrian base rock, the siliceous slate lies unconformably upon the hematite-quartz-schist and is underlaid conformably by the thick seam of the quartzite. It is exposed along the river bank and has commonly a reddish purple color, this being due to its containing iron oxide. In this siliceous slate, hematite-ore occurs to a width of 0.3-1.0 metre in the bedded form, but it is much restricted in quantity owing to its irregular distribution with the intervention of discontinuity at several points, which deprives it of commercial value.

The quartzite widely predominates to a great thickness on the northern and northeastern slopes of the mountains, protecting the several older and underlying seams above described. Ripple marks are frequently found in the quartzite. Granite occurs at the base of the hematite-quartz-schist on the southern slope in contact with it, sometimes directly and sometimes indirectly, in the latter case intercalating a thin seam of the green-schist. The rock is of a coarse structure constituting mainly pink orthoclase and quartz with slight flecks of muscovite; the weathering of the rock is so advanced as to make it impossible to get a fresh specimen.

As regards the tectonics, the hematite-quartz-schist strikes N45°-60°W and dips steeply above 50° to the northeast; especially on the cliffs along the river it forms above 75° and is nearly vertical in places. It need not be mentioned that the green schist occurs parallel to the hematite-quartz-schist. The strike of the quartzite is nearly parallel to that of the hematite-quartz-schist, (from north-



10. Showing the enclosure of a part of the hematite-quartz-schist in the gneissose granite (Ying-tao-yuan mine)



11. View of a cliff of the hematite-quartz-schist, formed by a transverse valley, measuring 140 metres in width. (Wang-chia-pu-tzu mine)

west to southeast), but it dips at a very gentle slope below 40°, and it is certain that the contact marks an unconformity; this is further substantiated by the occurrence of the conglomerate.

The intrusion of the granite dates later than these sedimentary rocks, judging from the intrusion into the green-schist, and in the neighborhood of the present river some masses of the hematite-quartz-schist seem to have been pushed forward by severe eruptions of the granite magma. The granite has a schistosity NW-SE, following the common direction in the An-shan district, due to the deformation suffered.

The occurrences of secondarily enriched ores in the Tung-an-shan mine intercalating amidst the hematite-quartz-schist to a width of 1.5 metres and usually accompanied by some porous limonite. Frequently, along a local fault plane, the hematite-quartz-schist is broken into fine pieces, and the schistosity disappears owing to the great friction, forming an enriched limonite of extremely loose structure.

3. Ta-ku-shan (Plate 7)

Ta-ku-shan mine is located 12 kilometres southeast from the An-shan station and is connected with it by a branch railway for the transportation of the ore. The base of the hill is 43 metres above the An-shan station. "Ta-ku-shan" literally means a prominent solitary mountain. It may be seen from a distance, rising about 180 metres above the surrounding alluvial lowland. The long axis of the mountain extends northwest-southeast, and the northeastern side is less steep than the southwestern, due to the differences in the rocks. It is dissected into two parts along a fault. The eastern part rises 290 metres above the track level, and the western part is a little lower.

The rocks are green schist, hematite-quartz-schist, quartzite, granite and diabase. Green schist in considerable thickness occurs overlying the hematite-quartz-schist. In the green schist formation, staurolite-phyllite and chlorite-schist are the most common rocks. Green schist exposed at the foot wall of the hematite-quartz-schist is generally very thin, intercalating frequently in the iron formation.

The hematite-quartz-schist constitutes the essential part of the mountain and forms an extremely rugged knob which is common in the district. Its fissility and its distinct magnetism are the noteworthy characteristics of this mine. It is also noticeable in this mine that the hematite-quartz-schist contains much actinolite besides a small amount of siderite, calcite. The hematite-quartz-schist has been worked as a primary ore to the total amount of about 80,000 tons since 1918. The average grade of the hematite-quartz-schist in this mine is about 35 per cent. to 36 per cent. of iron.

The quartzite occurs overlying the green schist, and frequently contains much iron oxide, but not enough to make it of commercial value. It is called ferruginous quartzite to distinguish it from the hematite-quartz-schist. In the Kuan-mien-shan mine, about 8 kilometres east of the Ta-ku-shan mine, ferruginous quartzite occurs above the hematite-quartz-schist, with a thick seam of green schist between them, just as is the case with the Ta-ku-shan mine.

The intrusive rock developes on the southwestern slope of the mountain, intruding the green schist (Fig. 5) and it is not difficult to detect the boundary with the other rocks by the surface feature, because of its ready erosion, although the exposure is generally very bad. The rock shows a distinct schistosity. It is composed of pink felspar and fine flecks of muscovite accompanied frequently by green dyke rocks and quartz veins. Judging from occurrences and its mineralogical characters, the rock seems to be a variety of the gneissose granite.

In the hematite-quartz-schist, the strike is E-W on the west side, and varies until it becomes N 70° W on the east side. The dip varies from 45° to 70°, always towards the north. On the southern slope of the mine, we found severe contortions of the strata suggesting a great synclinal structure of the hematite-quartz-schist.

The green schist strikes just the same as the above stratum, dipping over 70° towards the north. The direction of the schistosity of the granite is nearly parallel to the hematite-quartz-schist; this means that the mountain making stress was later than the eruption of the granite. Besides the great fault in the central part, several minor parallel faults are seen in the hematite-quartz-schist, crossing the strata at nearly right angles, through which some minor intrusions of diabasic dyke rocks occur.

The formations of the secondarily enriched ores are accompanied by limonite and milky quartz of open texture. In the western part, the ores are found upon the impervious bed of the green schist, while in the eastern part, they occur in a cavity formed by a local flexure. The ore-bodies vary in size, sometimes assuming a tabular form with a width from 1 to 2 metres. They assume in rare cases the form of an irregular round mass swelling to 5 metres in width, and from one body there could be mined as much as 500 tons, it being often possible to produce above 1,000 tons. The hematite-quartz-schist of the Ta-ku-shan mine often has a sufficiently high content of iron, that it can be worked for commercial purposes.

4. Ying-tao-yuan Mine (Plates 8 and 9)

The Ying-tao-yuan mine is located 12 kilometres due east of the An-shan station, but the railway line for the transportation of the ore runs around the north side and is more than 15 kilometres in length. This mine is situated in the northern division of the An-shan iron district, and the highest peak rises to an altitude of 150 metres above the surrounding alluvial plain. The range of the mine runs from NNW to SSE parallel to the strike of the hematite-quartz-schist, which constitutes the main part of the range.

The hill, in which the Ying-tao-yuan mine is situated, is formed of green schist, hematite-quartz-schist, quartzite and granite with minor diabase intrusions. The hematite-quartz-schist contains mostly a low percentage of iron, having never been worked. Only the secondary ores are mined. In the northern division of the Ying-tao-yuan mine, there occur secondarily enriched bodies, formed at the contact with the granite mass, accompanied by schists containing: scaly flecks of phlogopite, "devil's pyrite" and fine crystals of magnetite, etc. Some chlorite-schist seems to be formed from the hematite-quartz-schist, at the contact with the granite. Metamorphism due to the contact action is restricted to a comparatively small area, and the hematite-quartz-schist, a short distance from the contact, remains as poor ore.

The green schist has several phases; it is constituted of phyllite, chlorite-schist, sericite-schist and diabasic rock. The quartzite is predominant in the northern part of the district, and also locally remains overlying unconformably the hematite-quartz-schist. It frequently contains sericite. The intrusive rock is distributed abundantly in the north and northeastern part of the district. It is constituted mainly of pink felspar (orthoclase ?), microcline and quartz with a very small amount of black minerals. The rock is a acidic granite, judging from the chemical analysis (page 19). In the peripheral part of the granite, there appear muscovite and talcose felspar of indistinctly granular structure. Beside the granite, some traces of other diabasic intrusive rock could be detected in the northern part of this mine.

Reviewing the tectonic of the Ying-tao-yuan mine, the original arrangements of the hematite-quartz-schist and the green schist have been broken into pieces by the severe dynamic action due to the intrusion of granite magma (Plate 10). In the northern half of the hematite-quartz-schist, the strike varies from northwest on the north side, then turning northward, to northeast on the south side, and the dip varies from 55° to 75° always toward the west. It is nearly vertical on the cliff at the southern end.

It is noticeable that no green schist occurs in the foot wall of the hematite-quartz-schist, probably having been swept away from the place by the intrusion of the granite. In short, the great intrusions of the granite into the hematite-quartz-schist will tend to enhance the high grade of the secondarily enriched ores.

5. Wang-chia-pu-tzu Mine (Plate 11)

The Wang-chia-pu-tzu mine adjoins on the south of the Ying-tao-yuan mine, forming the boundary line with the valley Chi-chia-kou. The axis of the deposit runs from northwest to southeast. The hill is as usual composed mainly of the hematite-quartz-schist. The mine-lot is separated into three divisions, No. 1. No. 2 and No. 3 being divided by small valleys from the southern end, while No. 3 rises most prominently, being 230 metres above the An-shan station.

The rock of the mine is formed of sedimentaries such as green schist complex and hematite-quartz-schist with granite as an only intrusive.

The green schist complex is composed of diabase-tuff, hematite-schist and chlorite-schist at the foot wall of the hematite-quartz-schist, and sericite-schist and sericite-quartzite at the hanging wall, as seen on the geological map. The hematite-quartz-schist is the prevailing rock in the district, measuring 140-170 metres in breadth, but due to a low iron content, it has not been used as ore.

The ore mined is all of a secondary origin, being formed at the contact between the hematite-quartz-schist and the granite, intercalating commonly thin layers of green schist. On closer observation, there are found the alternation of Lematite-quartz-schist and several kinds of ores, of which we can distinguish three kinds ; compact ore, banded ore and ore associated with the green schist, while there are gradual transitions between the compact and the banded ore with accompanying pyrite and milky quartz. The ore associated with the green schist is formed by the admixture of iron oxide and green schist, to such an extent that the percentage of iron reached a commercial value, but the last is a rather rare case with the ores of the An-shan iron district. The breadth of the ores varies 0.3-4.0 metres, always occuring parrallel to the strike of the hematite-quartz-schist. (Plate 12-13).

A variation of the breadth of the ores is seen at a rather short distance, the ore being frequently found in irregular round masses. Judging from the occurrences and the allied minerals above described, the formation of the secondary enrichment seems to belong either to a contact metamorphism between the granite and the iron formation or to the action of the descending meteoric water. In this mine, we often find some rich porous ore of weak structure, due to the process of the leaching of silica, leaving the ore as residue.

Mining in Shantung

IN Shantung metallic and non-metallic minerals of many kinds are to be found in great abundance.

In the eastern part of the province, which is near the sea, most of the minerals are metallic ; while in the west, bordering on the provinces of Chihli, Honan and Kiangsu, the minerals are mostly non-metallic. Among these coal figures foremost.

The general conditions of mining of the province are as follow :

Gold is very important among the metallic minerals. The gold mine in the Lo Hill of Chaoyuan district is the most notable, and its vein covers several *li*. Twenty years ago it was abnormally productive, but recently it has gradually declined.

There is also a famous gold mine at Ju Tien, in the district of Pingdoo, that has been worked for 300 years. The total value of the minerals taken out at intervals amounts to at least $10,000. There is a gold mine at Weihaiwei, in the district of Wenteng. It is a British enterprise, and belongs to the Wei Hai Mining Company, but it is said to be unprofitable. There are also large amounts of gold dust in Fushan, Ninghai and Mao-ping. Also there are mines exploited by old methods in Lingchu, Anchiu, Poshan, Ishui and Chu-Hsien.

According to the reports of the geological survey of China of the ministry of agriculture and commerce, the amount of gold in Shantung is 2,600 ozs., and occupies a mineral area of 332 *mow*, and the whole area of developed mines of all kinds is 477 square *li*.

Copper, Iron, Lead and Tin

The province has silver, copper, iron, lead and tin. The largest copper mine is that of Tao Shia-chwang, in Licheng. It is developed by Mr. Chu, conjointly with a Japanese company. The largest iron mine is that at Ching Ling Chen, in Itu. There is magnetite, limonite and hæmatite in this mine, and the Germans formerly had ambitious plans with respect to it. It now belongs to the Shantung Railway, and is owned entirely by Japanese. It is reported that the quantity of iron in this mine is 14,000,000 tons. The magnetite at Ching Hua Sahn, in Peng Lai Shan, and the hæmatite mine at Au San Kao, in Che Hsien, are also well known.

As to lead, Pingdoo and I Hsien have the largest quantities. There are tin mines in Lingchu, Chu Hsien and Che Hsien. There are also small quantities of quicksilver and arsenic.

As to the non-metallic mines of this province, the principal ones are coal, quartz, clay and quartz crystal. The largest coal mines are in Wei Hsien, Fangtse, Tsechuan, Hung San and Che Hsien. Among these the Hangsan mine is the richest. The Chung Hsin Company in Che Hsien is managed entirely by merchants. Its yearly product is above 300,000 tons and its future is promising as it has an extensive market throughout the lower Yangtze region. Although the Hua Feng Company of Ningyang came into existence later, its yearly output already reaches the total of 600,000 tons. It formerly belonged to Germany, and is now occupied by Japan.

There are great resources along the Kiaochow-Tsinan line. In addition there are coal mines in Fei Hsien, Lin I, Yencheng, Changchue, Ningyang, Hsintai and Laiwu, but in these districts the mines are largely developed by ancient methods, there being no large-scale production.

New Industry in the F.M.S.

China Clay Works in Perak

THERE has been established recently in the Federated Malay States a new industry which is likely to have a far-reaching influence upon the economic life of those states and may have the effect of inducing capitalists to launch other local enterprises of an industrial nature.

The new concern is the Malayan China Clay and Pottery Company, Limited, which has been formed to work the rich clay deposits found in the alluvial tin-mining districts of the State of Perak. The Sultan of Perak is taking a keen interest in the developments.

The initial work was begun 12 months ago, and the Malay workers have proved such apt pupils that the company is already turning out porcelain of a high standard of quality. Both the casting and the "jolleying" methods are employed, and it is said that by the latter method a native operator with a little experience could turn out 2,000 latex cups (used for collecting rubber) in a working day of eight hours. With an installation of 12 machines, it is expected that the works will manufacture latex cups at the rate of over 30,000 per day, and it should be possible to place these latex cups on the market at a price against which the imported article could not compete.

Before manufacturing, the company gave a valuable prize for the best design for a latex cup, and this prize was won by a local planter.

The works are established at Gopeng, in the centre of the tin-mining district. Apart from the manufacture of articles locally, the company is supplying china clay to two of the largest groups of cotton mills in Bombay and to paper mills in Calcutta. It is understood that people connected with the English china clay industry have offered to buy the whole of the Gopeng output, and that the clay has been proved definitely to be equal in quality to the best English china clay. When the labor is more skilled, the company intends to make porcelain in bulk.

Dutch East Indies Development

THE big public works program for 1922 which has been undertaken by the Netherlands East Indies government, will give some idea of how the Dutch are using the recent loan floated in the United States and England. The largest item in the budget, as will be seen from the following, is for harbors, mines and transportation.

PUBLIC WORKS EXPENDITURES

	Dutch Florins.
Building and workshops required for the postal telegraphic and telephone service	1,406,500
Buildings and works necessary for the maintenance of the salt monopoly	135,800
Buildings and works necessary for the government printing department	441,350
Buildings and other works required by the marine department	1,317,750
Buildings and workshops necessary for the aeronautics (advancement)	1,410,000
Bridges and constructional works for the maintenance of canals, rivers, dykes	9,343,000
Irrigation, drainage, dams, and pier works	14,424,000
Work in the interest of public health	4,015,500
Harbor of Tandjoeng Priok (Batavia)	9,697,125
Harbor of Soerabaja (Java)	15,466,503
Harbor of Makasser (Celebes)	816,492
Harbor of Belawan (East Coast of Sumatra)	5,747,430
Harbor of Emmahaven (West Coast of Sumatra) ..	904,261
Harbor of Semarang (Java)	2,306,805
Harbor of Tjilatjap (Java)	861,730
Small harbors	3,302,324
Other expenses indirectly connected with the harbor service	1,437,000
Dredging service	5,075,075
Expenditure in connection with the development of hydraulic and electric power	7,670,825
Exploiting of government mines	39,266,044
Preliminary steps connected with the possibility of exploiting iron ores in Celebes	Not yet decided
Post, telegraph, and telephone service..	22,989,060
State railways and tramways, also automobile services	93,010,020

Even so large a program, however, can only be appreciated by those who have some knowledge of the extent and potentialities of this group of markets. Java alone has a native population of 36 millions, who are every day, as the development of their country advances, becoming better buyers of manufactured goods in great variety, particularly textiles, hardware and footwear; while the planters and industrialists are growing users of agricultural and other machinery, motor vehicles and chemicals.

Of the 3,323,000 acres under rubber cultivation in the world as many as 885,000 acres, or nearly one-fourth, are in the Dutch East Indies; palm oil is produced there to nearly 100,000 tons annually, against 125,000 in West Africa, and is of purer quality as a result of better processes; 90 p.c. of the world's supply of quinine comes from Java. Java tea takes precedence in quality over all other varieties; the same island can produce four tons of sugar per acre against only one ton in India. More than half the total of Singapore tin is drawn from the Dutch East Indies; amazingly rich deposits of nearly pure copper have been recently discovered in Timor, iron and coal quite near the surface in Celebes, and diamonds in Borneo; gold is being mined in Sumatra; and enormous forests of teak exist in the last island, and are only awaiting exploitation.

Borneo, as yet practically undeveloped, is, excluding the continent of Australia, the largest island in the world, and Sumatra, practically undeveloped also, is destined to prove one of the richest. Java is at present the only island of this group where the vast agricultural and mineral wealth is being exploited to any degree, and when Sumatra, in the future, is developed to an equal extent, her importance as a world supplier will be colossal.

Rubber—now rising once more in value—tea, sugar, coffee, quinine, copra, palm-oil, tobacco, pepper, and nutmeg, to mention only a few of the many agricultural products, are nearly all found in such quantity that the presence of a single commodity would ensure the importance of the islands. And in addition to these there are the wealthy tin mines of Banka and Billiton, the recently-discovered copper mines in Timor, and petroleum wells, gold, diamond, coal, and iron mines scattered broadcast.

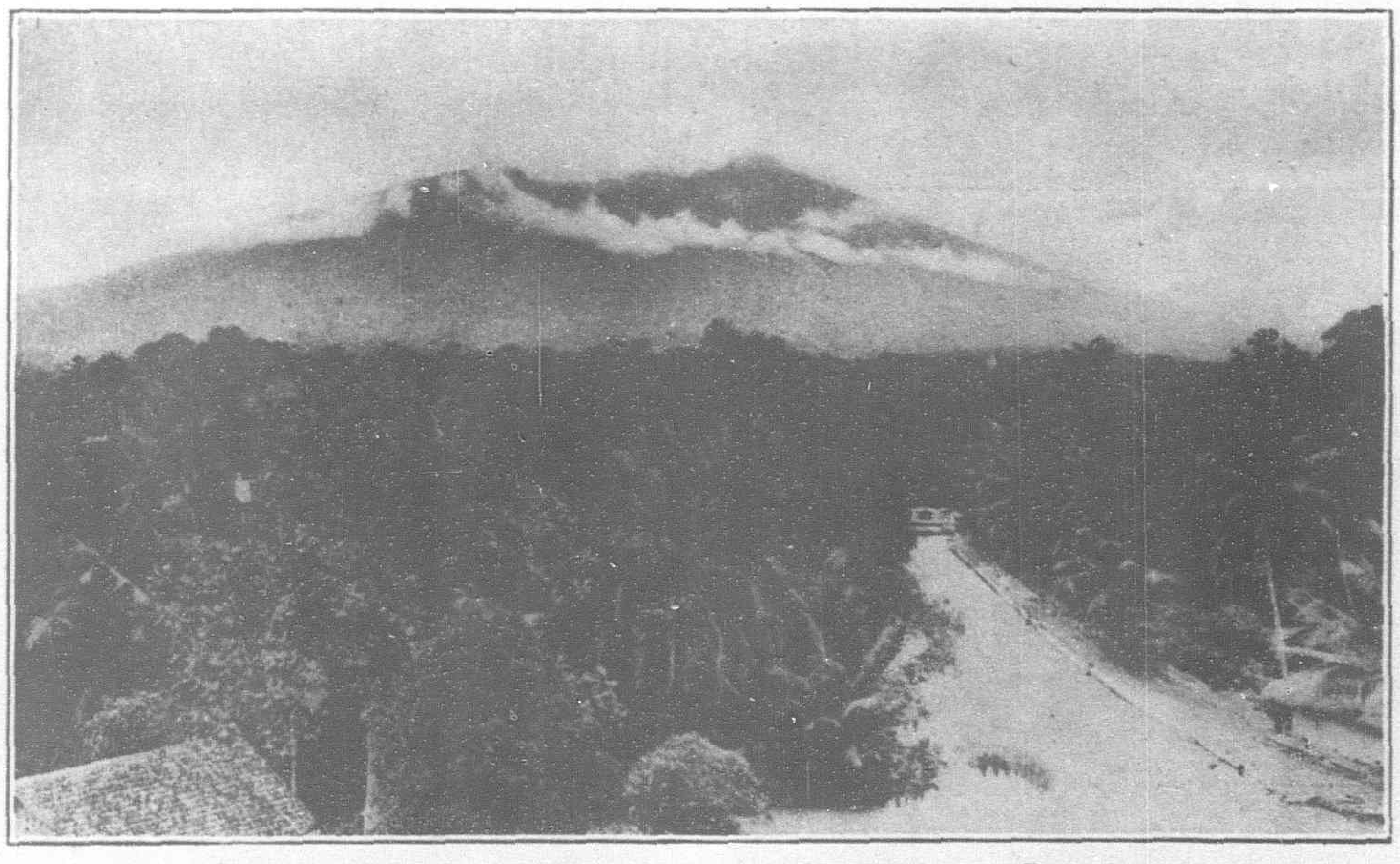
It is to these islands that India must look for a great deal of the raw material she will require as her needs increase and as the output of her industries grows greater. The Djambi oil-fields, from which are obtained annually over 17,000,000 barrels of petroleum, are the nearest source of supply for her motor industry, and, to-day, Dutch East Indian spirit is to be found in the tanks of motor-cars throughout the empire.

Java practically controls the world's quinine supply, and enormous quantities of this drug pass from the Dutch East Indies to Calcutta and other ports.

A considerable bulk of what is known as "Singapore tin" comes in reality from the mines of Banka and Billiton, and Java ranks chief among the exporters of sugar to India. During September, 1,081,478 cwts. of the best grade alone—"Java 23"—found their way into Indian warehouses.

One of the newer plantation industries—so far as the Netherlands East Indies are concerned—is the cultivation of the oil-palm, and it is not beyond possibility that this branch of agriculture will prove the source of great additional wealth.

It is only a comparatively short time since the first oil-palms were brought into the islands, but in Sumatra, especially, the industry is developing at such a

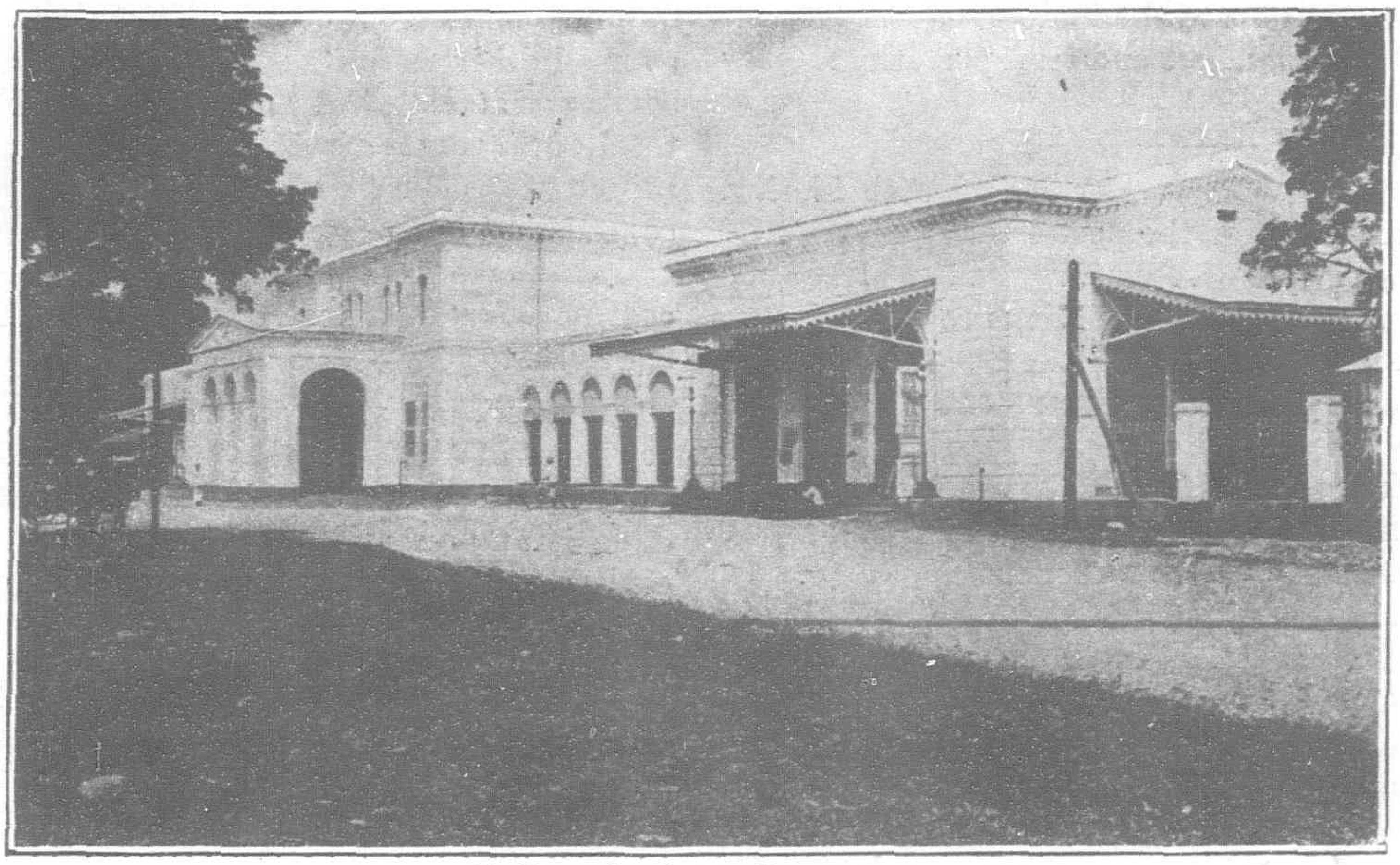


The Beautiful Roads of Java: View of Mt. Salak near Buitenzorg

tremendous rate that the position West Africa now holds in this respect is being seriously menaced.

According to a conservative estimate in a very few years 100,000 acres will be covered with oil-palms in Sumatra alone, and the exports from that island will be something like 100,000 tons annually.

Copra production is, of course, an older industry, and, at present, a more important one. Throughout the world there is a serious shortage of edible fats for both human and animal consumption, and exports of this produce will have to increase to an enormous extent before any difficulty will be experienced in finding a market. India, alone, is a copra buyer of enormous potentiality, and her proximity to the Dutch East Indies will undoubtedly react favorably on the market. If Sumatra had been developed a little earlier, perhaps vegetable and not animal fat would have been used to smear the cartridges used by the Indian soldiers in 1857, and it would have needed another pretext to plunge the country into war.


Railway Station at Buitenzorg

Copra, one of the main constituents of margarine and of the other fatty compounds used in the preparation of food, is the fruit of the wonderful *klapper*, or coco-nut palm, which can be used in such a multitude of ways. No part of the tree is thrown away. Fruit that falls to the ground before it is ripe is made by the natives into medicines. Ripe nuts are eaten both raw and cooked. The hard shell is made into spoons, mugs, and plates; and from the fibrous covering we obtain what is known as "coir," which is made into string, matting, brushes, etc. Even the leaves of the palm can be used to thatch the native huts; and when the tree is tapped, alcohol can be distilled from the latex. Copra is made from the kernel, and its importance has increased tremendously since the discovery of the "deodorizing" process. It is very largely used in the manufacture of cattle-foods, such as oil-cake, as well as in the manufacture of margarine, etc.

Agriculture is the principal but, nevertheless, only one occupation in the Netherlands East Indies. Factories are hard at work turning out all kinds of goods, and ships are being built in at least two of the seven well-equipped shipyards to be found in the islands. Ropes, bricks, chocolate, jam, are all manufactured to some extent; but the whole of this production is swallowed up by the home demand, and still the islands offer—indeed invite—tremendous opportunities for trade.

A great opportunity exists in providing machinery and other plant required for full industrial exploitation. For example, there are now 14 large factories in Java alone producing copra, and a further seven in the other islands. Old factories are being enlarged and re-equipped, and new ones built. In 1920, 400,000,000 kilogs. of crude oil were produced. So excellent is the organization of the sugar industry that the sugar committee of India have recently expressed the opinion that the adoption of Javanese methods is essential to progress in the Indian sugar industry. There is undoubtedly an excellent opening at the present time for makers of machinery for sugar mills to do a large trade with the Dutch East Indies, and the same is true of rice-milling plant, in Java alone there being upwards of 50 rice mills. As a sugar producer Java ranges next after Cuba and British India, the island's production coming little short of two million tons annually. In addition to the plantation products already mentioned Java produces in abundance coffee, cocoa, tobacco, coconuts, fibres of various kinds, and many spices.

Comprehensive Irrigation Schemes

Increasing attention is being directed to irrigation, and it is to the credit of the Dutch Government that it has always promoted enterprise in this direction. But the primitive irrigation of the past is now being superseded by more comprehensive schemes, which are being actively pushed forward not only in Java and Madura, but wherever possible in Sumatra, Celebes, and in the southern and eastern districts of Borneo. In the five years from 1914 to 1918 over 33 million guilders were spent on irrigation works in Java and Madura, and 3,500,000 in the outlying islands. But this is regarded as only a beginning, and in all the islands the authorities are showing increasing activity in this matter, with the prospect that in the near future the agricultural possibilities of the Dutch East Indies will be enormously enhanced. In the meantime, the

The Oranje Hotel at Soerabaia

The Kampong Kodo, Menado

work is involving considerable engineering activity and the placing of important contracts.

The Growing Demand for Factory Equipment

Manufacturing industries in this market are still in their infancy, but, the tendency in this direction is significant, and the opening for industrial plant are steadily increasing. Already the manufacture of bricks and tiles, soap, card-board, tinware, paint, brooms, sugar, molasses, beer, leather, rope, casava flour, macaroni, and various chemicals has been undertaken, and even a glass factory is under consideration. Machinery, tools, and implements were before the war supplied almost wholly by Germany, who held the market by keeping local stocks of replacements and repairs. But the demand for these appliances is now much larger, and so far Germany has not been able to maké any considerable post-war impression on the market. In regard to carpenters' tools, the trade is chiefly in cheap hammers, a popular type having the steel handle extending through the eye and locking on the upper side of the head.

An Especially Big Market for Motor Vehicles

Communications in Java are good, but in the outlying islands they are still inadequate. Java is well supplied with railways and a good net-work of well-kept roads upon which run motor vehicles in increasingly important numbers. There are over 20,000 motor cars in Java alone, most of them of American make. From January to April of the present year 2,642 cars were imported, of which as many as 1,711 came from the U.S.A. The climate is especially destructive in regard to tyres, for which the demand is therefore proportionately large. The types of commercial lorries mostly in use on the estates are varied, the vehicles being mainly of two to three tons capacity, and equipped with tipping devices.

The Dutch East Indies are a particularly big market for cotton goods, importing no less than 42,631,000 kilogs of cotton cloths in 1920, in addition to 167,000 kilogs of woolens, 67,000 of half-woolens, 140,000 of silk, and 20,000 of half-silk goods. This was practically double the amount for 1919. British cotton goods are preferred, and in 1920 Great Britain supplied 14,098,000 kilogs, against 10,282 by Holland. Japan two years ago was the biggest source for imports of alum, copper sulphate, and sulphuric acid, and one of the biggest in calcium carbide and sodium carbonate. The contributions of Japan in all these lines is this year *nil*, while Germany's is steadily increasing.

The Need for Local Selling Agencies

Sufficient will have been gathered from the foregoing to indicate that the Dutch East Indies are worth a great deal more commercial attention than is at present paid to them. As a purchaser of all descriptions of merchandise they are already taking a high place, but their prospective value is infinitely greater. The present business is transacted chiefly through a few big firms established at the principal ports of Java, and is exceptionally safe in character; but, whether for good or evil, there is no denying the fact that tendencies are becoming apparent which have for their object a widening of commercial activities and a breaking away to some extent from the influence of the old-established importing concerns, who are sometimes accused of obstructing the introduction of new lines. The only practical way to attempt to gain an entry to the market is by establishing local agencies. That might not be possible in all cases, but groups of manufacturers might combine successfully. The big estates especially are excellent buyers, and are keen for anything which is suitable for their requirements and up-to-date.

Huge Trade Openings in Prospect

To open an office in the Netherlands East Indies it is necessary to register with the authorities in Batavia, but otherwise there are no restrictions under Dutch law. It is, however, essential that representatives of business houses should establish their credit with Dutch organizations, and they should have the highest credentials, carrying as many influential introductions as possible, while a full knowledge of the standing of their principals should be lodged with the leading banks. Here, then, is a market with an industrious population of upwards of 40 millions, with a particularly astute and progressive body of planters and industrialists, a government keen to promote development in every possible way—for the Dutch are specially successful in colonial administration and enormous natural resources that are steadily being opened up. No greater inducements could be offered for the application of persistent commercial enterprise.

Powerful Reclamation Dredger for Bombay

MESSRS. Wm. Simons & Co., Ltd., Renfrew, has launched a large cutter suction pump reclamation dredger which they have constructed for the high commissioner for India for work at Bombay in connection with the Back Bay reclamation scheme which is being carried out under the direction of Sir George Buchanan, K.C.I.E., etc., of Messrs. C. S. Meik & Buchanan.

The dredger which is named the *Sir George Lloyd* after the governor, is fitted with a powerful pumping plant designed to dredge 2,000 yards of clay per hour from depths up to 70-ft. and discharge same through a floating pipe line fitted with ball and socket joints to a distance of 5,000-ft. from dredger. On certain sections of the work for which this dredger has been designed, the distance of discharge required is 10,000-ft. and to permit of this distance being obtained, the builders have on hand a floating pumping station arranged for coupling to the floating pipe line, and fitted with plant capable of discharging to a distance of 5,000-ft. and to a height of 16-ft. above water level.

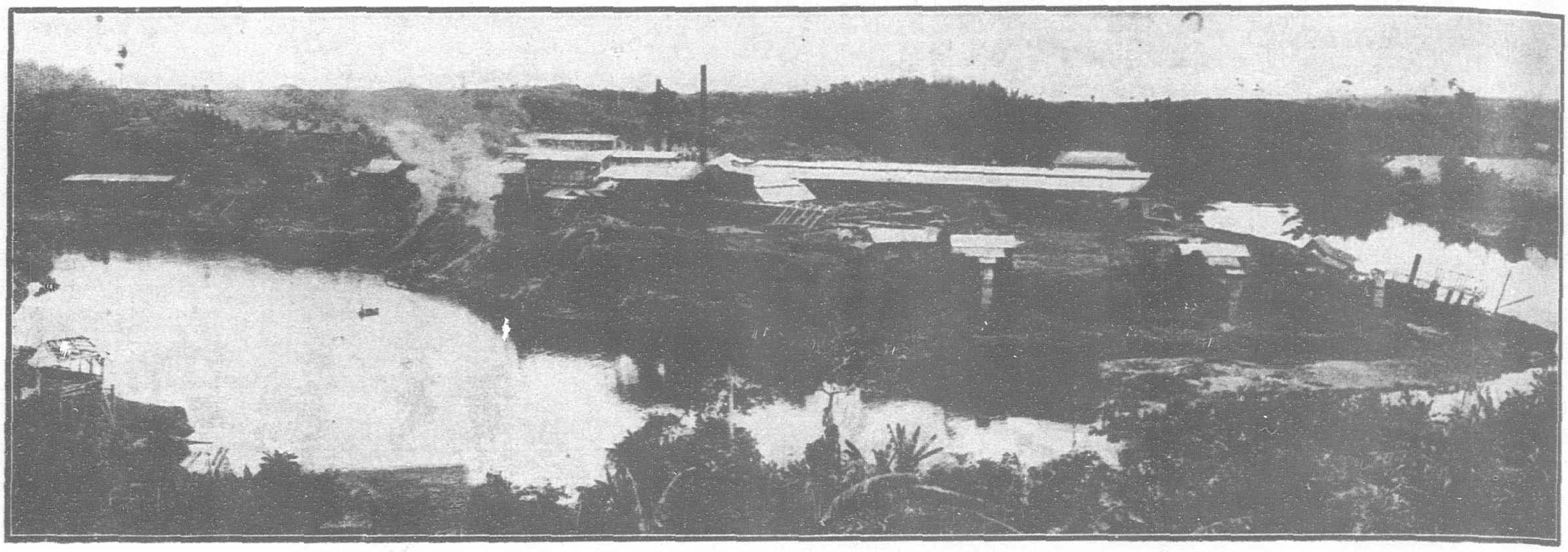
The dredger has been constructed under the supervision of Messrs. Sir J. H. Biles & Co., Glasgow and London, naval architects to the Indian government.

It is arranged that the vessel will proceed to Bombay under her own steam and for this purpose two sets of compound surface condensing engines are provided, capable of giving the dredger a speed of 8 knots.

The pumping outfit consists of a very large centrifugal suction and discharging pump directly coupled to a set of triple-expansion surface-condensing engines. A spiral rotary cutter is fitted on lower end of the suction frame driven by steel spur gearing by a set of compound-surface condensing engines. The suction frame is controlled by independent steam hoisting gear.

Steam is supplied by four large cylindrical multitubular boilers constructed to Lloyd's requirements for 180-lb. working pressure and fitted with Wallsend-Howden forced draught and oil fuel installation.

The control of the dredger is centred on the operating bridge, so that one man can direct all the operations of the dredger and the pipe line, also the intermediate pumping station, telephone communication being fitted between the vessels.



Mill of Insular Lumber Company on Island of Negros

Export Timbers of the Philippines

THE Philippines possess a much greater supply of wood than will ever be used for local demands. The wood consumers of other countries can, therefore, find here a market that will furnish them a large and varied supply for practically all uses to which wood is put; large, because of the immense amount of certain widely useful species which can be obtained by the millions of board feet; varied, because the woods of few countries of equal size, if indeed any at all, can show a wider range of color, grain, hardness, strength and other qualities demanded by special uses. It is no exaggeration to say that some species of wood can be found in the Philippine forests to suit almost any imaginable purpose the user may have in mind.

Export timbers fall roughly into four principal classes; woods for interior finish and furniture, cabinet woods, woods for special uses and heavy construction timbers.

1. *Interior Finish and Furniture Woods.*—The prime requisite of a wood for these purposes is that it be at least fairly abundant. Also, it must be not very difficult to work and to finish, of good size, and last, but not least, of pleasing texture and color. All of these requisites are fulfilled by the woods of the dipterocarp (lauan) family. This family (to which belongs nearly three-fourths of the standing timber of the Islands) occupies the place that the conifers do in the North Temperate Zone, but possesses a wider range of color, hardness and other qualities. The lauan group of the dipterocarps contains the greatest amount of timber specially fitted for interior finish and furniture. Tanguile, red lauan, almon and white lauan are obtainable in great quantities, have a fine ribbon grain when quarter-sawn, and, in texture and color, the first two resemble true mahogany and its substitutes very closely. White lauan differ from them only in color, being white with a very pale grayish-brown tint. It is pretty in natural finish where a light color is desired and, on the other hand, lends itself very well to staining. Almon, a very pale red lauan, is similar to white lauan as regards stains. All of these were little exploited and used during the Spanish *régime*, but the estabishment of the steam logging industry has put on the market an ever-increasing supply, so that now large quantities are used for medium and high-grade interior finish and furniture. These woods are now being used in Europe and America in the manufacture of high-grade furniture for cases of musical instruments, such as piano and phonograph cases, and for other uses where a beautiful figured wood is desired. The wood is also strong and for this reason it is used in the manufacture of aeroplane blades.

The other woods of the same family, guijo and apitong, are also abundant. This fact and their greater hardness enable them to fill a demand for flooring in place of oak, red beech, maple and other American woods which are yearly becoming scarcer. Guijo is light ashy brown to reddish brown and apitong is somewhat darker. Finished with wax or varnish, they range from reddish brown to dark chocolate. Both are hard and of rather fine texture. If a very hard wood is desired for flooring, yakal, the hardest and heaviest of the dipterocarps and the most abundant of the hard, heavy and durable woods in the Philippines, will fine a place.

There are several woods of other families which, though not as abundant as the lauans, are still to be obtained in sufficient quantities to supply industries that do not require many millions of feet per year. Such are lumbayau, pagatpat and nato. Lumbayau is similar to red lauan in appearance, but is slightly harder and tougher and has a more conspicuous flake grain when quarter-sawn; nato is of similar color and texture, but of very homogeneous grain; pagatpat also is very even-grained, but of a rich dark-brown color.

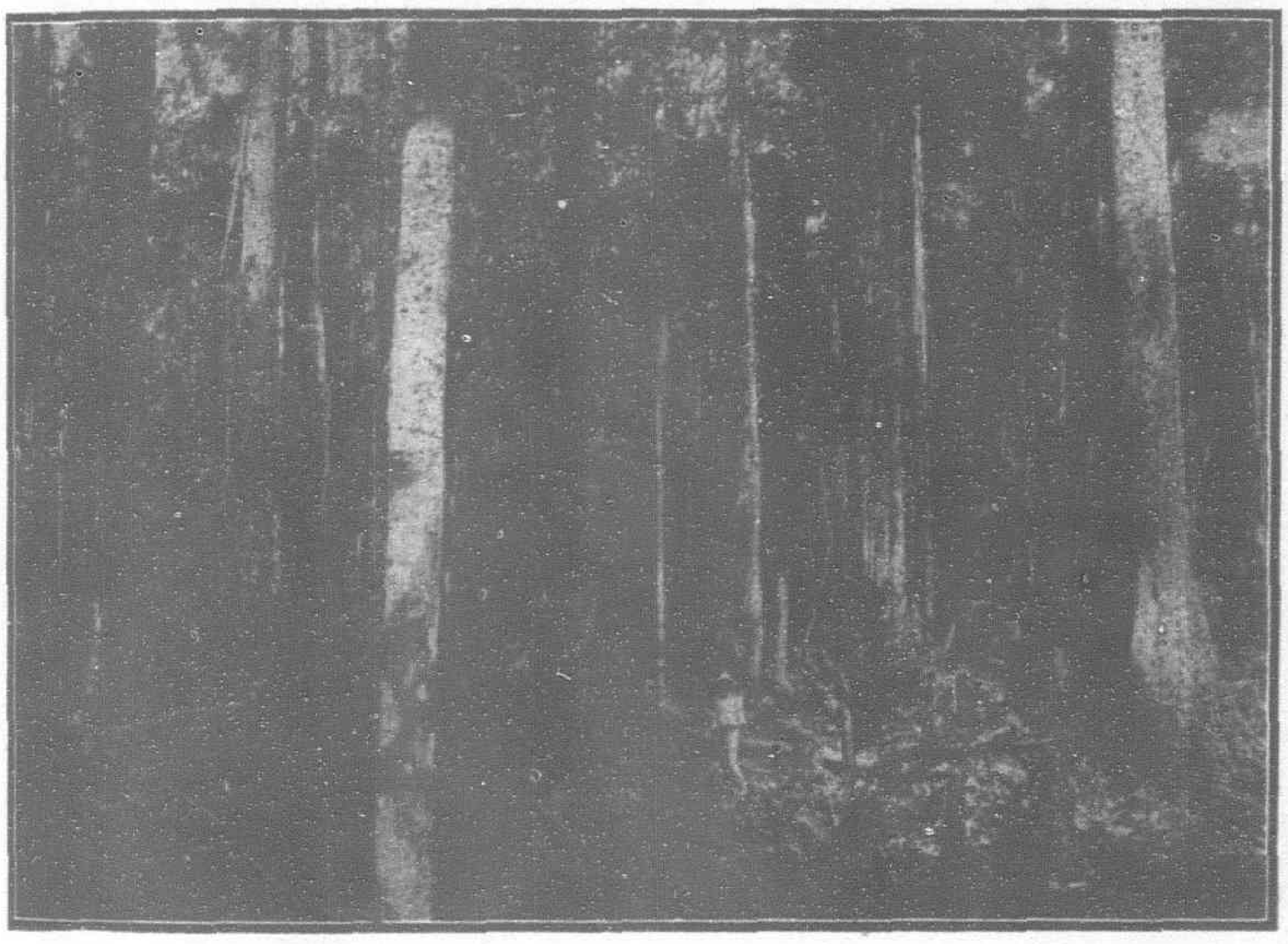
There are also frequently used in the Philippines narra, tindalo, acle, molave, supa, calamansanai, ipil and other hard, durable and beautifully colored woods; for the export trade, however, these woods, on account of their beauty, comparative scarcity and higher price, should be rather classified as cabinet woods.

2. *Cabinet Woods.*—Of these the Philippines possess such an astonishing variety that it is difficult to give any idea of them in a short pamphlet. Foremost among this class on account of their large size, beautiful color and grain and durability are the woods of the narra (or locust) family—acle, banuyo, ipil, narra, supa and tindalo—all of which would delight the eye of every American maker of fancy furtniture and cabinet-work. A dining-room set, a piano, a billiard table, or any similar piece of furniture made of one of these would attract attention at once no matter what comparison it might have to bear with other aristocrats of the lumber world. To attempt an enumeration of different classes of cabinet-work, naming for each one the various Philippine woods available would necessitate much unnecessary repetition. Perhaps the easiest way to give the cabinetworker a notion of what he may demand (and obtain) for his purposes is an enumeration of some of the better-known woods roughly classified by colors: Black-ebony; black, streaked or mettled with red-brown or gray-camagon, ata ata, bolongeta (the Philippine persimmons); dark brown-dungon, ipil, mancono, pagatpat, pahutan; reddish brown-apitong, batete, betis, katmon, guijo, nato; red amugis, bansalagin, ka-

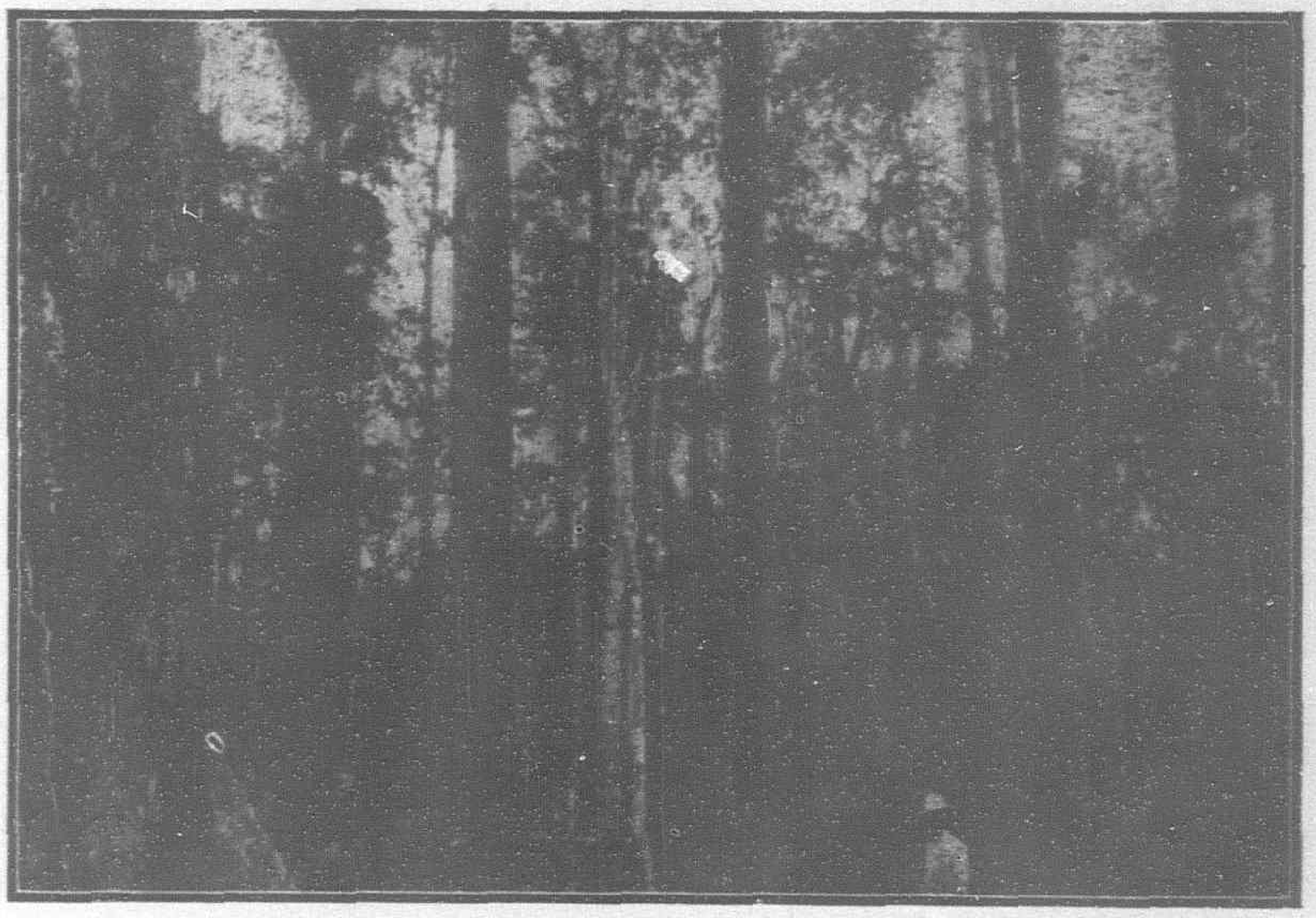
lantas, nato, palo-maria, sibukao, tabigi, tukangkalau; grayish-banawi, makaasim, tabau; yellow-alintatau, bankal, batikulin, malakadios; pale straw color, creamy or nearly white—lanete, miao, white nato, molave. It must not be thought that the foregoing list is complied with a view to color alone, any and every wood, good, bad or indifferent, being dragged in to fill up; on the contrary, those named are all good woods, rarely attacked by boring insects, and not generally subject to discoloration except in the case of such light-colored woods as are easily stained by too slow or otherwise inefficient seasoning. In fact, the list could be doubled by including other woods used, on account of their varied color and grain, for musical instruments, fine cabinetwork, sculpture and carved articles, canes, hilts and sheaths for weapons, inlaid and mosaic work, desk and toilet novelties, picture frames; etc.

3. *Special Uses.*—For bowling balls, bearings, stern shaft bearings, mancono has been used successfully. For the first-named purpose, dungon has also been found good. Bansalagin, alupag, malabayabas and tiga, all of fine texture, difficult to split, and very heavy, are recommended for experiment. For such articles as dumb-bells, paperweights, etc., requiring weight but not necessarily so fine and tough a texture, not only these, but a considerable number of other very hard and heavy woods are available.

For tool handles and other wooden parts of tools, there are generally required woods that are either hard or tough or both. Chisel and hammer handles and mallets especially need to be hard, tough, and difficult to split; for these agoho, betis, calamansanai, dungon, guijo, malugai, palo-maria and yakal can be supplied; all these woods are by far more resistant to white ants and fungi than either hicory or ash. Handles made from the latter woods have to be continually moved in ware-houses of the tropics because white ants and other insects attack them very readily; two of these, guijo and yakal, can be obtained in very large quantities, while the others occur in quantities sufficient to make tool handles, if not by millions, at least by thousands. Most of these, as well as many others equally hard or harder but not so tough, would supply turned and shaped handles such as grips and butt plates for braces and drills, plane and saw handles, plane bodies, scratch gages, scraper and drawknife handles, and hollow-tool handles.



Typical View of Hardwood Forest



Philippine Forest Trees—Island of Negros

For long agricultural tool handles, in which hardness is less essential than toughness and difficulty of splitting guijo, the hardest grades of lumbayau, malugai, manggachapui and yakal would make excellent substitutes for ash. The same species, with the exception of lumbayau, would make good axe handles.

For wagon tongues and other vehicle stocks, hubs, spokes and felloes, an excellent material is found in guijo; it is not very heavy, but tough, difficult to split, and can be obtained in any size and quantity desired. In tropical countries, guijo withstands the weather better than hicory and would find use in the manufacture of spokes intended for use in the tropics. Malugai, which is a little lighter, but equally tough, is not as abundant as guijo, but can still be supplied in fair quantities.

The Cigar-box lumber par excellence of the world has for many years been the "Spanish cedar" of tropical America; in calantas is found a perfect substitute, so nearly identical in color, texture and odor as to be almost indistinguishable. It is the only native wood used in Manila for high-grade cigar boxes. For cheaper boxes several of the lauans and nato are used.

Shuttles and spindles must be hard, rather tough and resistant to abrasion. For these purposes a considerable supply of the sapwood of the trees of the camagon (persimmon) tribe could be furnished. Calamansanai and malabayabas are also recommended for trial in shuttles.

4. *Heavy Construction Timbers.*—A number of large trees furnish hard, strong and very durable construction timbers. It is scarcely probable that the United States market will seek any considerable quantities of such material, except for very special pieces of work; but three species at least are to be mentioned as furnishing a supply of magnificent posts or beams for all kinds of heavy wooden structures, namely, ipil, guijo and yakal. Allied to heavy construction is the use of timber for railway ties, durability and strength being the two qualities required. For this last purpose not only the three species above named are available, but at least twenty others are found, which, although they are not large enough or are not found in sufficient number to yield a great supply of large timbers, still can furnish ties for steam or electric railways. This statement refers, of course, to ties used without any preservative treatment. For treated ties, both the number of kinds and the supply available are much greater; practically all the lauans are very abundant and of great size and the majority are suscoptible to impregnation. Their mechanical properties are similar to the yellow pines (long leaf, short leaf and loblolly pines) of the United States. Beside the lauans, there are two harder woods available in great quantities, namely, guijo and Apitong. Apitong properly treated would make very superior ties in the tropics while in the temperate regions, it can be used untreated.

Following are brief descriptions and notes on some of the most important timbers of the Islands:—

Dipterocarp Family

TANGUILE (*Shorea polysperma*).—This is the best of the group so far as concerns grain, figure and hardness, though it has not the rich red color of red lauan.

Red Lauan (*Shorea negrosensia*).—This, as its scientific name indicates, is most abundant in the island of Negros. It is one of the largest trees in the Islands, reaching sometimes a diameter of 7-ft. or over. Quarter-sawn, the wood has a beautiful ribbon grain which, with its red to dark reddish-brown color, has led to its being exported together with tangile and almon under the trade name of "Philippine mahogany," though it is not at all related to the mahogany family. Red lauan has been used in the last few years in great quantities for interior finish, high-grade furniture, cases of musical and scientific instruments.

Tiaong (*Shorea teysmanniana*).—This is intermediate in color and texture between mayapis and red lauan, being of a very uniform, light, glossy red. It is abundant in south-central Luzon, but very little, if any, comes to the Manila market, as no large operators have located in this region up to the present time.

Mayapis (*Shorea squamata*).—This is a very pale red lauan of straight-grained, smooth, glossy texture. It would make a very pretty veneer where a light red color is desired, but could also very readily be stained. It is less abundant than either red lauan or tangile.

White Lauan (*Pentacmo contorta*).—This is perhaps the most abundant and certainly the most widely distributed species of its family in the archipelago. The wood is whitish with light-gray, yellowish or very pale-brown tints. It is light, rather soft, with a fairly straight but slightly crossed grain, producing a narrow "ribbon" when quarter-sawn.

Kalunti (*Shorea, Mindaneensis sp.*).—This is even lighter in color than white lauan and possibly a little softer and lighter in weight. It has not heretofore come into the Manila market in any great quantities nor under its own name it is found, as far as known, only in Mindanao and some of the adjacent smalerl islands.

(To be continued)

Douglas Fir Ties in China

ACCORDING to Canadian Trade Commissioner J. W. Ross, Douglas fir and Oregon pine have not yet been thoroughly tested for railroad tie purposes, and he refutes the claims made by Australian and Tasmanian lumber producers that hardwoods are preferable on account of their alleged longer life and resistance to dry rot. He says:

In my opinion Australian and Tasmanian hardwood is not likely to be extensively used for sleepers in railways in North and Central China in the future, any more than in the past, for the reasons which are given below. In the first place, it should be stated that neither Oregon pine nor Douglas fir sleepers have ever been used on Chinese railways to any extent, as the following statistics of imports will show. Accordingly the statement that they have a short life cannot be proved, for the reason that no extensive use of them has ever been made.

The following tables of imports of railway sleepers into China for 1913, 1919 and 1920 will show that neither Australia nor the United States nor Canada furnished any considerable quantity of sleepers to China, but that Japan received nearly the whole of the trade in each of these years:—

1913	Total imports	1,539,836 pieces
	Japan	1,444,540
	United States	14,621
	Australia	None
	Canada	None
1919	Total imports	1,521,706 pieces
	Japan	1,510,519
	United States	None
	Australia	None
	Canada	None
1920	Total imports	1,810,176 pieces
	Japan	1,710,350
	United States	64,946
	Australia	19,457
	Canada	None

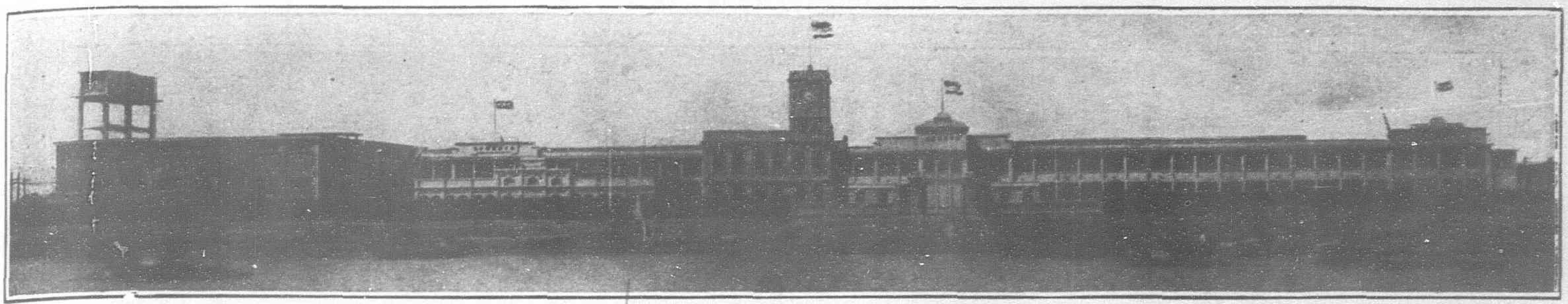
The question may be asked, "Why is it that in these—as in all others for the past nine years—Japan has been the only country that has furnished railway sleepers to China in any great quantity? and the reply is, entirely on account of the cost, Japan being able to supply the needs of China in sleepers at a price lower than they could be imported from any other country. Without doubt hardwood sleepers from any other source would be superior to and more desirable than untreated sleepers from Japan; and this is why neither Australia nor the United States nor Canada have within recent years received any great share of the demand for sleepers for Chinese railways. The Chinese government railway administration have no great surplus of funds for any purpose, and whenever they are in the market for (say) 500,000 sleepers, they hesitate about paying $2,500,000 or more for the filling of the specification when the same quantity can be purchased for $1,000,000. From working statistics which have been prepared by competent railway engineers, the life of an untreated Douglas fir or Oregon pine sleeper on the railways of North and Central China is from five to seven years, and that of a creosoted pine sleeper from ten to twelve years, and of Jarrah wood from Australia fifteen years or more. A difference of opinion exists among railway officials as to which is the cheaper. A number contend that, although the initial cost is greater, the long service and infrequency of replacement make Jarrah wood, at three times the cost of Douglas fir, just as cheap in the long run. Others maintain that the high initial cost and interest on invested capital more than counterbalance the greater length of life of the sleepers.

Siamese Railways

At the present time the Siamese department of state railways has completed, or has under construction, the following length of line:—

	Completed Kilometres.	Under Constructions Kilometres.
Northern line (including the Korat, Petriu, and Sawankaloke lines—i.e., all the normal gauge lines)	950.5	78
Southern line (including branch lines)	1,301	44
North-Eastern line (Korat to Ubon)	—	100
Eastern Extension (from Petriu to Aran Pratet and the Cambodian frontier)	—	99
	2,251.5	321
	(1,407 miles)	(200 miles).

Survey work has been completed on the north-eastern line for a distance of 311 kilometres, and on the eastern extension for a distance of 119 kilometres, says the *L. and C. Express*. Railhead on the northern line is now at Chiengmai, and on the southern line at the Golok river, the final terminus on the Kalantan border. Plate-laying has not yet commenced on the other two lines. Work is proceeding with the conversion from broad-gauge to metre gauge of the line between Bangkok and Korat. Conversion has already been effected on the line connecting Bangkok with Petriu. The metre gauge will in time be applied to the whole system of the country. Tenders haver ecently been invited by the department for the supply of superstructures for steel bridges and of bogie rail trucks.



Front View of the Mill

The "Great China" Cotton Mill at Shanghai

ANOTHER large cotton mill financed by Chinese capital held its formal opening on April 14 last. This was The " Great China " Mill, considered to be one of the best organized and equipped mills in the country. It was promoted in 1919 by Mr. C. C. Nieh, president of the Chinese chamber of commerce and managing director of the Heng Foong Cotton Manufacturing Company, Ltd., and Mr. E. R. Yin, a Harvard graduate.

The new mill property is situated on the north bank of the Wan Tsao Pang creek, and covers 149,811 *mow* of land. A few hundred yards away are the Whangpoo river and the Wan Tsao Pang railway station, making the location admirable as far as transportation is concerned.

The authorized capital of the company is Taels 2,000,000. Last year, the company purchased 11,000 spindles of American manufacture, with accessories, in addition to the 35,000 spindles of English manufacture already purchased. The present property of the company, including machinery, buildings, power plant, etc., represents an investment of Taels 2,800,000, an average of Taels 600,000 per 10,000 spindles. This cost is considered the cheapest among all of the newly established cotton mills in China.

The organization of the company is simple and efficient. Under the general manager and the assistant general manager are the general office and three departments, spinning, electricity and construction. The general office is subdivided into sections, such as correspondence, business accounting, store, warehouse, etc. Each department is headed with an expert, under whom are clerks and foremen. At the close of every day, reports are made by the clerks and foremen to their respective department heads, who in turn submit reports to the general manager and the assistant general manager. With this detailed information at hand, the managers can tell at a glance the working of the mill, the production, etc., and thus can shape their business policy accordingly.

A separate office is established in Shanghai, which buys cotton, sells yarn, and also keeps the important books of the company.

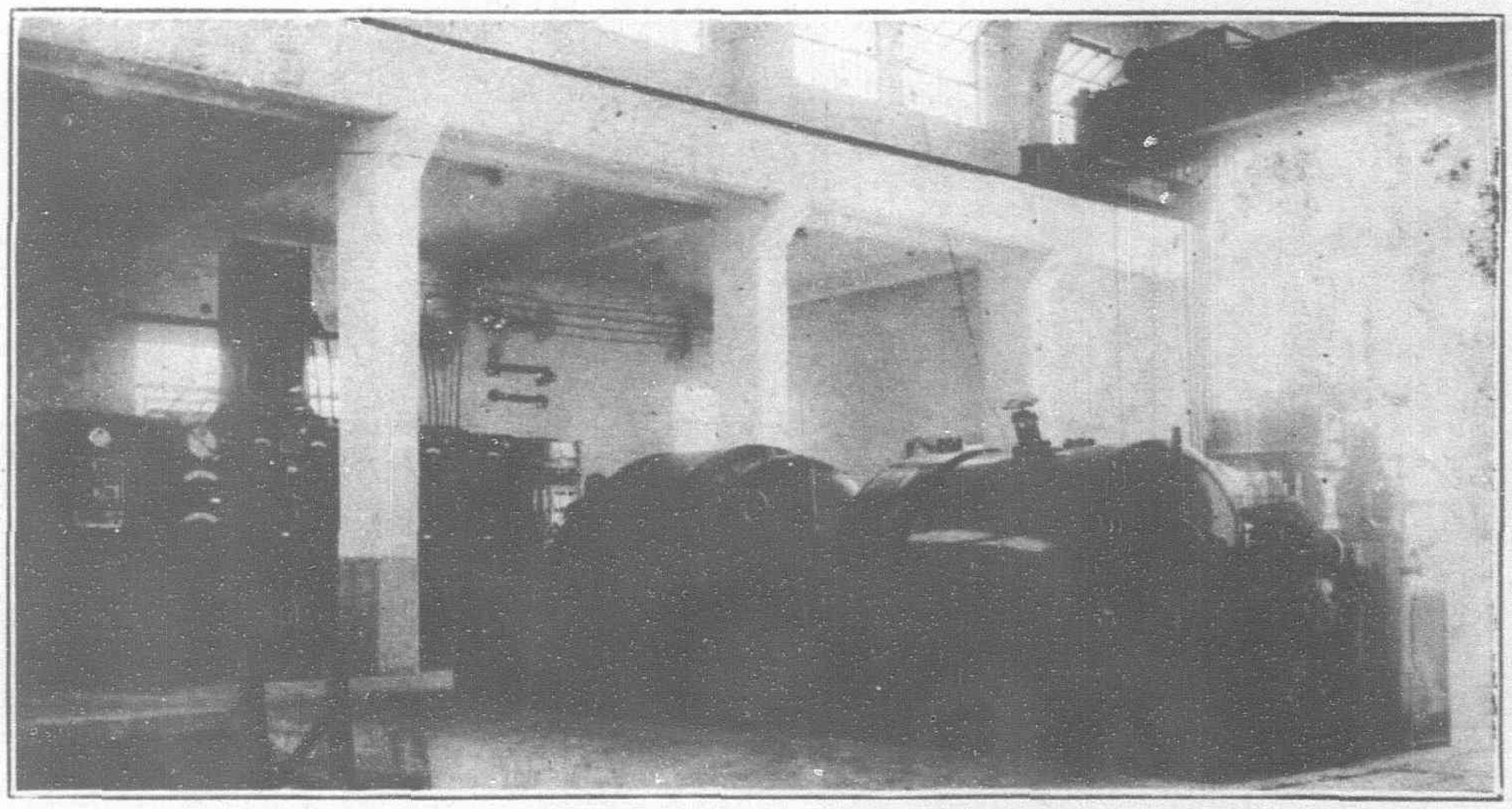
The mill produces yarns of 10 counts to 40 counts. With the most up-to-date machinery and modern appliances, operated by experienced hands, the result is a product excellent both in quality and appearance. This can well be testified by the fact that the yarn is welcomed by consumers and is enjoying a high market price.

The main mill, godown and power plant are tow-storied buildings of modern design in reinforced concrete, fire-proof construction. The main mill is 120-ft. wide and 700-ft. long and is well lighted with steel sash. The shop and office buildings are of modern design, built of brick and wood. The dormitory and lodging houses are Chinese style, built of brick and wood. The kitchen and dining room are Chinese style, built of bamboo and plaster. Special attention has also been paid to building roads, drive-ways, fences, drainage, etc., thereby enhancing the value and appearance of the mill.

The mill is equipped with 45,000 spindles spinning machinery, 11,000 of American manufacture, Saco Lowell make, and 35,000 of English design made by Messrs. Brooks, Doxey & Co. The machinery is run by electricity generated by two 1,000 K.W. turbo alternators, one of German make (Gorlitzer Maschinenbau) and one from the English Electric Company. The power plant consists of four Babcock and Wilcox boilers.

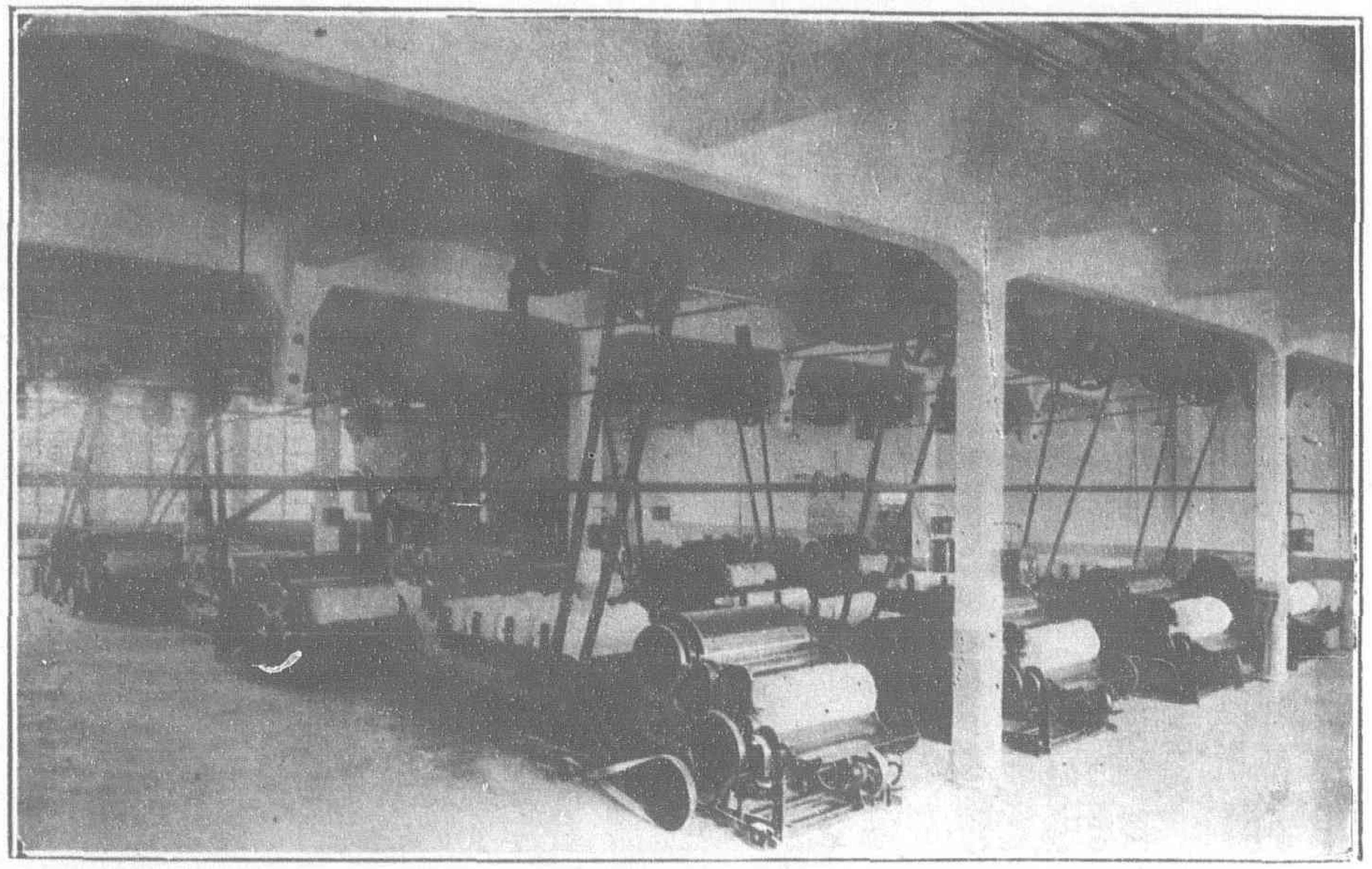
The mill employs about 2,000 laborers. Three-fourths of them are women workers. An employees' club was organized for the welfare of employees. A special reading room has been assigned to the club, in which are placed periodicals, commercial and industrial journals and all kinds of newspapers. Football teams, basketball teams, tennis teams, boxing teams, etc., have been organized. A weekly meeting is held at which employees are present and during which moving pictures and lectures are given.

The company's trade-mark is the map of the republic of China.

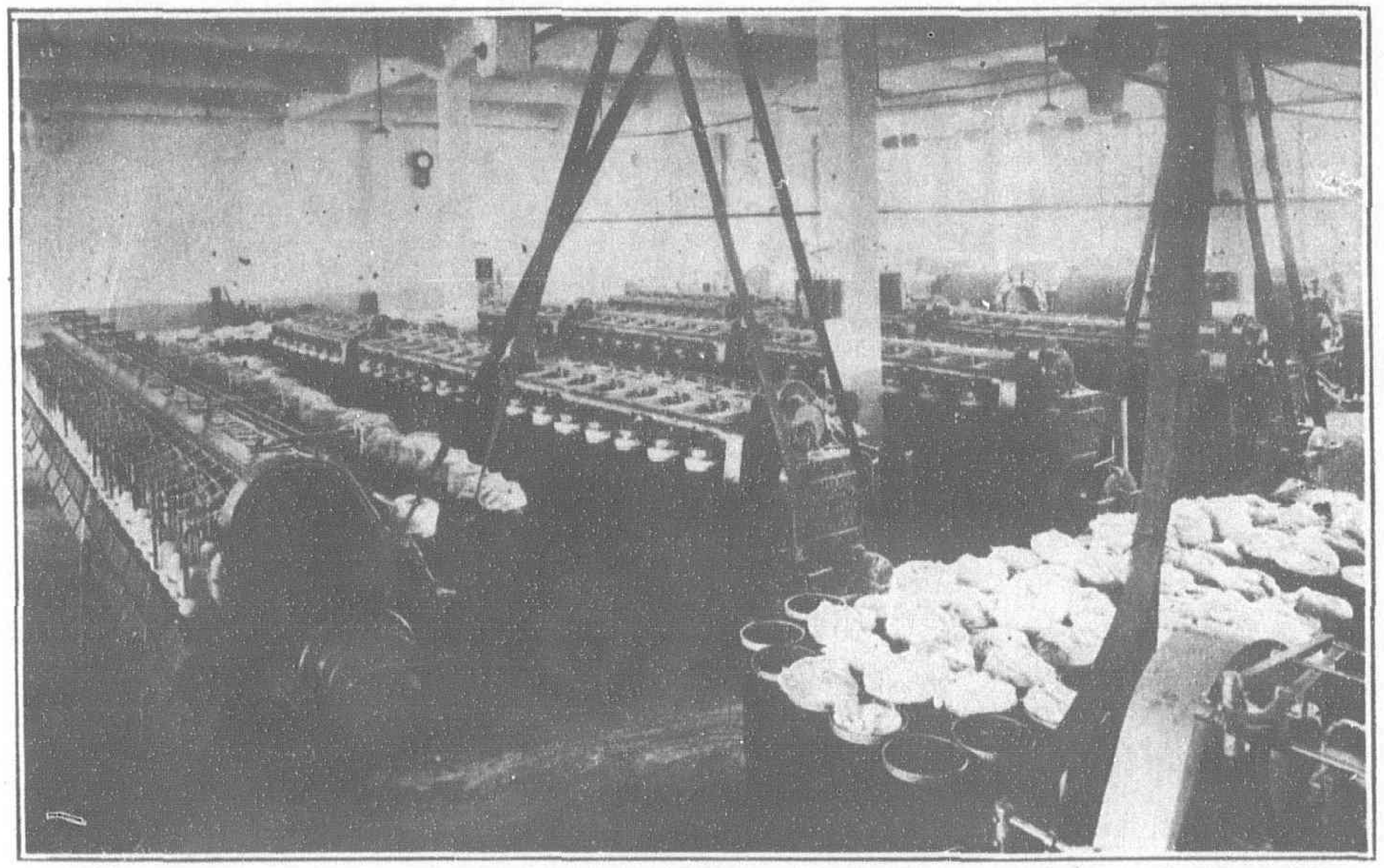


Dick-Kerr (English Electric Co.) 5,000 K.W. Turbo-Generator

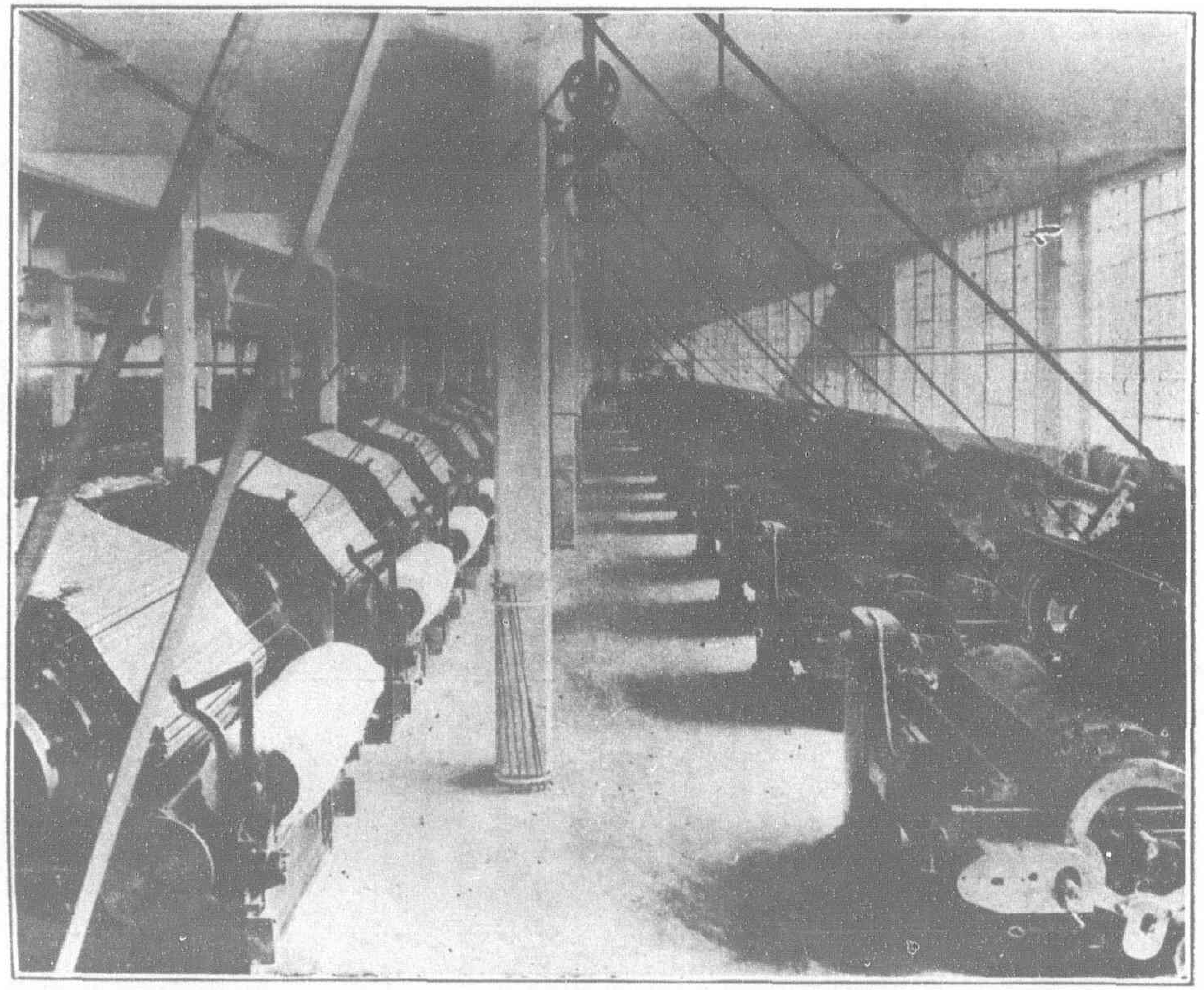
THE "GREAT CHINA" COTTON MILL



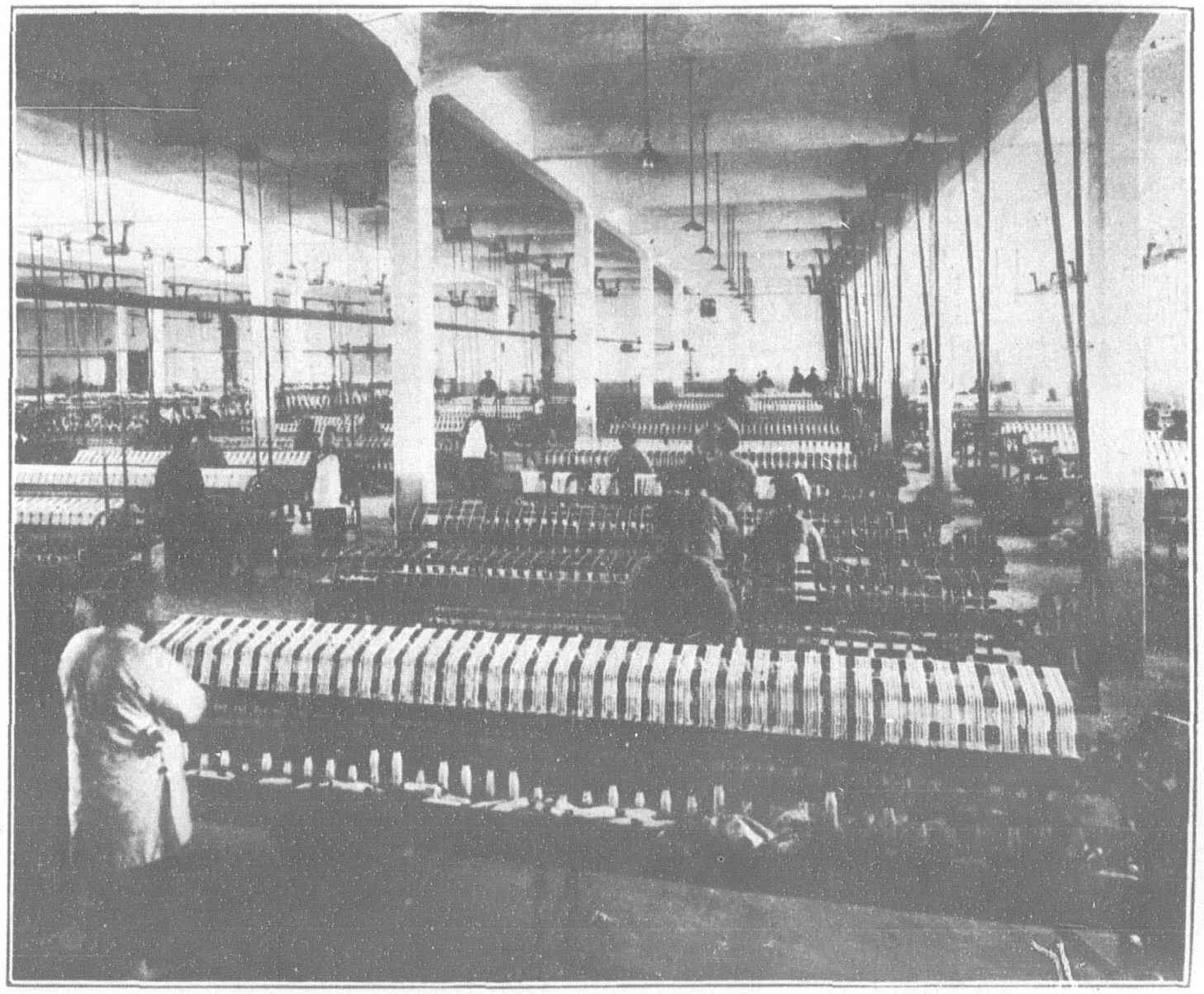
Scotching Machines



Brooks and Doxey Drawing Machines



Carding Machines



Reeling

Swiss Water Turbines in Asia

I. Japan

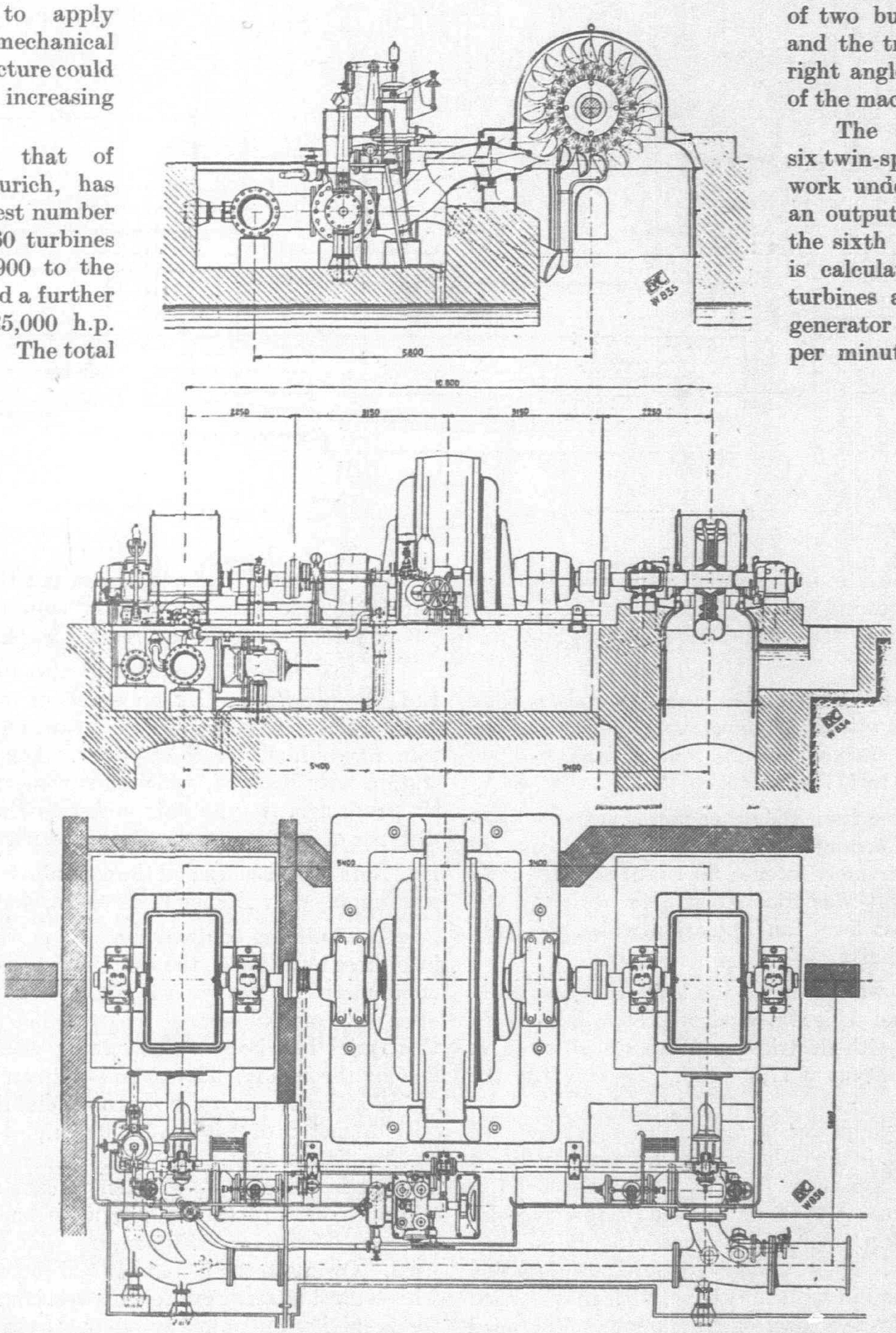
THE tremendous strides made by Japan during the last fifty years are a matter of common knowledge. Towards the end of last century, the need for power made itself felt, and the utilization of water power first thought of. The electrification of the railways is making great strides, and this explains the rapid construction of water power plants, especially in the vicinity of the great centres.

The projection and building of the plants has remained in the hands of Japanese firms, while it was found necessary to apply to foreign firms for the mechanical parts, as the home manufacture could not supply the rapidly increasing needs of the country.

Of European firms, that of Escher Wyss & Co., Zurich, has supplied by far the greatest number of water turbines, viz., 260 turbines for 500,000 h.p., since 1900 to the end of September, 1920, and a further 40 turbines for about 125,000 h.p. are in course of execution. The total deliveries, therefore, comprise 300 turbines with about 625,000 h.p. output.

Japan called for large untis from the very beginning; turbines of less than 1,000 h.p. are rare. The average output of the turbines sent by Escher Wyss & Co. to Japan during the last twenty years amounts to close on 2,100 h.p., that of the turbines ordered in 1920, as much as 3,600 h.p.; among these there are units of 17,000 h.p.

The configuration of Japan is exceedingly favorable for all sorts of waterfalls, and it may be said that up to now only falls of medium height have been utilized. There are practically no low-pressure plants, and high-pressure plants work with a maximum of falls of 300 to 400 metres: in other countries falls of 1,000 and more metres are utilized. Hence it is easy to understand that Francis spiral turbines are mostly used and that important power stations are equipped with these. We mention a few of these stations here. The greatest need for electric energy for lighting and power is at the capital, Tokyo. Several companies have undertaken to supply this power, so that in the last twelve years various large power stations have been built. Of these special mention may be made of the Tokyo Electric Light Co., the Katsuragawa Electric Power Co. and the Kinugawa Electric Power Co.



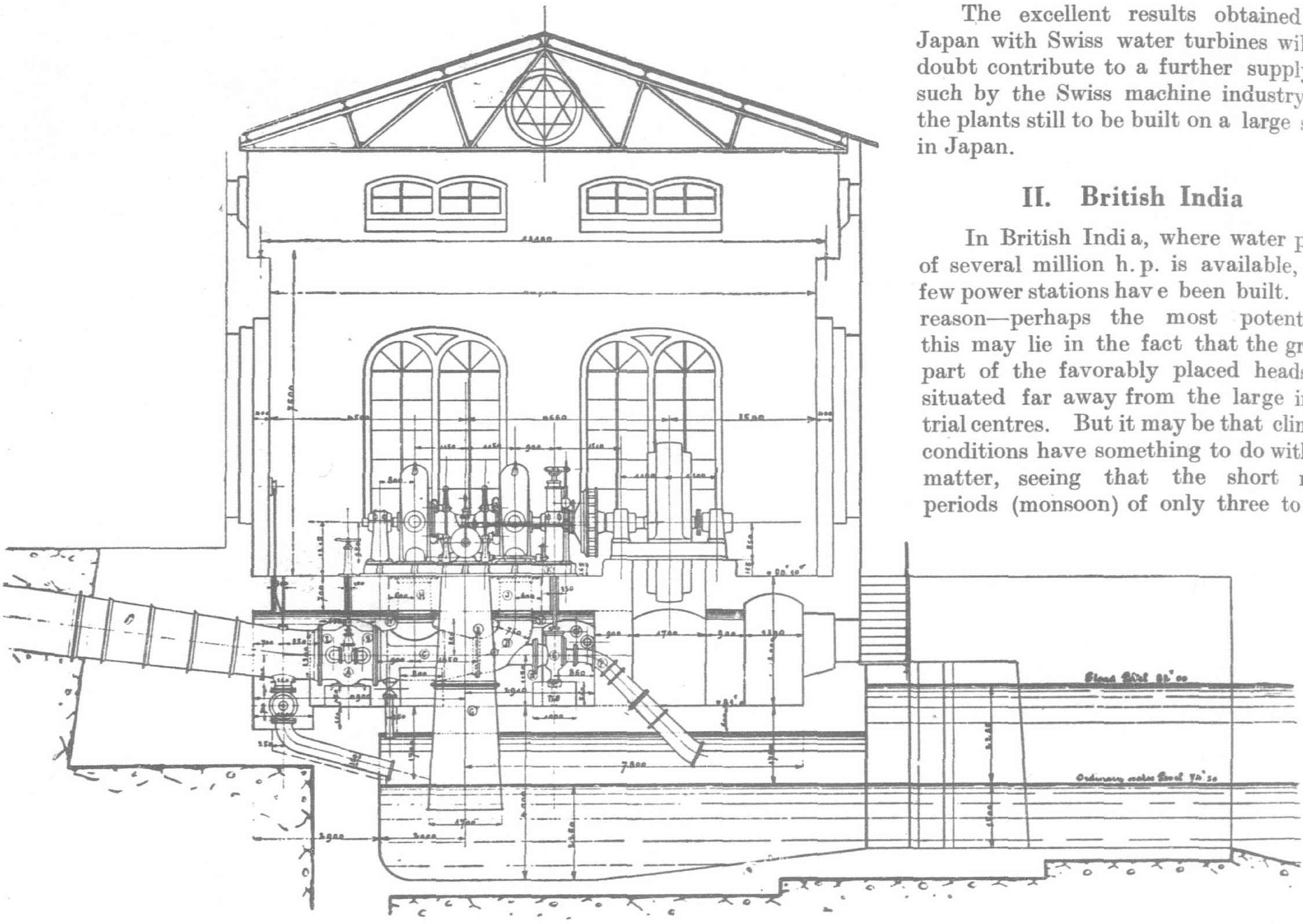
Plan, elevation and section of an electro-generating set with two tangential wheels, universal oil-pressure governor, and relief valve, supplied to the Kinugawa Co. in Japan by Escher Wyss & Co.
6 large Turbines aggregating 81,000 H.P. 2 small Turbines aggregating 1,800 H.P. Head 320 m.

The first company opened a station of 27,000 h.p. on the river Katsura, 170 kilometres from Tokyo, in 1908. Fig. 2 gives a sectional view of the plant with the various pressure pipings leading to the turbines. The plant consists of two buildings, the machine hall and the transformer house built at right angles to the upper face wall of the machine house.

The station is equipped with six twin-spiral turbines, five of which work under a fall of 95.5 m., with an output of 4,500 h.p. each, while the sixth (which was supplied later) is calculated for 4,950 h.p. These turbines are coupled direct to the generator and make 500 revolutions per minute. The division into six groups with a comparatively small output was caused by the difficult transport conditions.

The second station built by the same company on the same river in the years 1910 to 1912, already exhibits larger units of a maximum output of 12,500 h.p. In normal work, five turbines together supply 50,000 h.p., the sixth turbine being kept in reserve. The net head fluctuates between 112 and 120.5 m. Large twin-spiral turbines were likewise chosen for this station so as to avoid too large dimensions on the one hand, and, on the other, to obtain a higher number of revolutions by employing two runners. Fig. 1 shows the plan, elevation and section of the turbines installed in this plant.

The general arrangement of the engine house is seen by Fig. 1, together with the pressure conduit of about 215 metres length, the diameter of which is 1,860 mm. in the upper



Sectional view of the Kinugawa Hydro-Electric Power House

zone and diminishes to 1,650 mm. in the lower. The whole turbine house had to be built underground in order to gain head by the construction of a long tail race. The transformer house, however, was built on the surface.

The Katsuragawa Electric Power Co. have two stations, the second of which is fitted up with turbines supplied by Escher Wyss & Co. in 1919. The station contains four groups of 9,200 h.p. each for a head of 114 to 117 m.

A considerable difference from the other power stations mentioned, lies in the vertical arrangement of the shafts, a state of things occasioned by the extremely intense fluctuations of the level of the tail race, so that it was found desirable to place the generator above the highest level, an operation which was only possible by using vertical shafts.

The same arrangement was made for the three turbines lately ordered for the plant of the Ujigawa Hydro-Electric Co., which supplies the town of Osaka with electricity. With a head of 45 m. each unit is to produce an output of 17,000 h.p. These will be the largest turbines in Japan.

To return to the Tokyo power stations. The plant of the Kinugawa Electric Power Co. is the only large high-pressure station in Japan. It was built in the years 1911 to 1912. The head of 320 metres is one of the highest in the country used for this purpose. Six generators of 12,500 h.p. each are coupled directly on both sides with tangential wheels. Another high-pressure power station may be mentioned in connection with the above, viz., that carried out on a southern island by the town of Kumamoto. The head here is 240 m. and the water is conveyed in pipes of 850 m. length to the four tangential wheels of 2,700 h.p.

Finally, we may mention the central at Kidzugawa, which has two groups of 2,700 h.p. each for a head of 22.25 m.

The excellent results obtained by Japan with Swiss water turbines will no doubt contribute to a further supply of such by the Swiss machine industry for the plants still to be built on a large scale in Japan.

II. British India

In British India, where water power of several million h.p. is available, very few power stations have been built. One reason—perhaps the most potent—for this may lie in the fact that the greater part of the favorably placed heads are situated far away from the large industrial centres. But it may be that climatic conditions have something to do with the matter, seeing that the short rainy periods (monsoon) of only three to four months annually, make the construction of huge reservoirs an imperative necessity if a constant supply of water for feeding the power stations is to be secured the whole year round.

In this respect, the Tata Hydro-Electric Power Supply Co., Ltd., Bombay, have set an excellent example by constructing a great number of reservoirs by means of which they intend to obtain a very high degree of power. For the time being the power station near Khopoli, which commenced operations about five to six years ago, is supplying power to Bombay at an approximate distance of 70 kilometres. A second plant is in building.

Both the turbines and the conduits for the first plant at Khopoli were supplied by Escher Wyss & Co., Zurich.

The building of dams made it possible to bank up the water into three large lakes, the combined volume of which is 280 million cubic metres. The water is conveyed to the water chamber by an open canal of 7 kilometres' length. The water transverse section of this canal has been so calculated that the maximum of water flowing through is sufficient to obtain an output of 120,000 h.p.

For the time being, a pressure conduit of 2.5 kilometres' length, with diameters of 2,100 to 1,800 mm., leads from the water chamber to the distributing pipe, where the branching-off takes place in four further pipes of 1.4 km. length each and a diameter of 1,070 to 960 mm., each of which feeds a turbine of 13,500 h.p. The net head is 505 metres, which means that only tangential wheels are used. Owing to the height of the head and the large output, these wheels must be made entirely of cast steel. The water jets necessary for supplying the power are amongst the largest ever used till now, being 190 mm. in diameter.

The turbines are coupled direct to generators with 300 revolutions a minute, producing an alternating current of 5,000 volts; this is stepped up to 100,000 volts and conveyed in conduits of 70 km. length to Bombay, where the power is chiefly used for spinning mills.

Among other Indian plants are the power station at Cauvery Falls, built by the government of Mysore. Since 1900, 14 tangential wheels have been fitted up there, the output of which varies between 1,250 and 2,700 h.p. with a head of 120 m. The turbine supplied last year by Escher Wyss & Co., Zurich, will develop 5,600 h.p. This is a Francis turbine, as, of recent times the use of these for heads of over 100 metres is nothing extraordinary. Escher Wyss & Co. have further supplied a number of smaller turbines to British India.

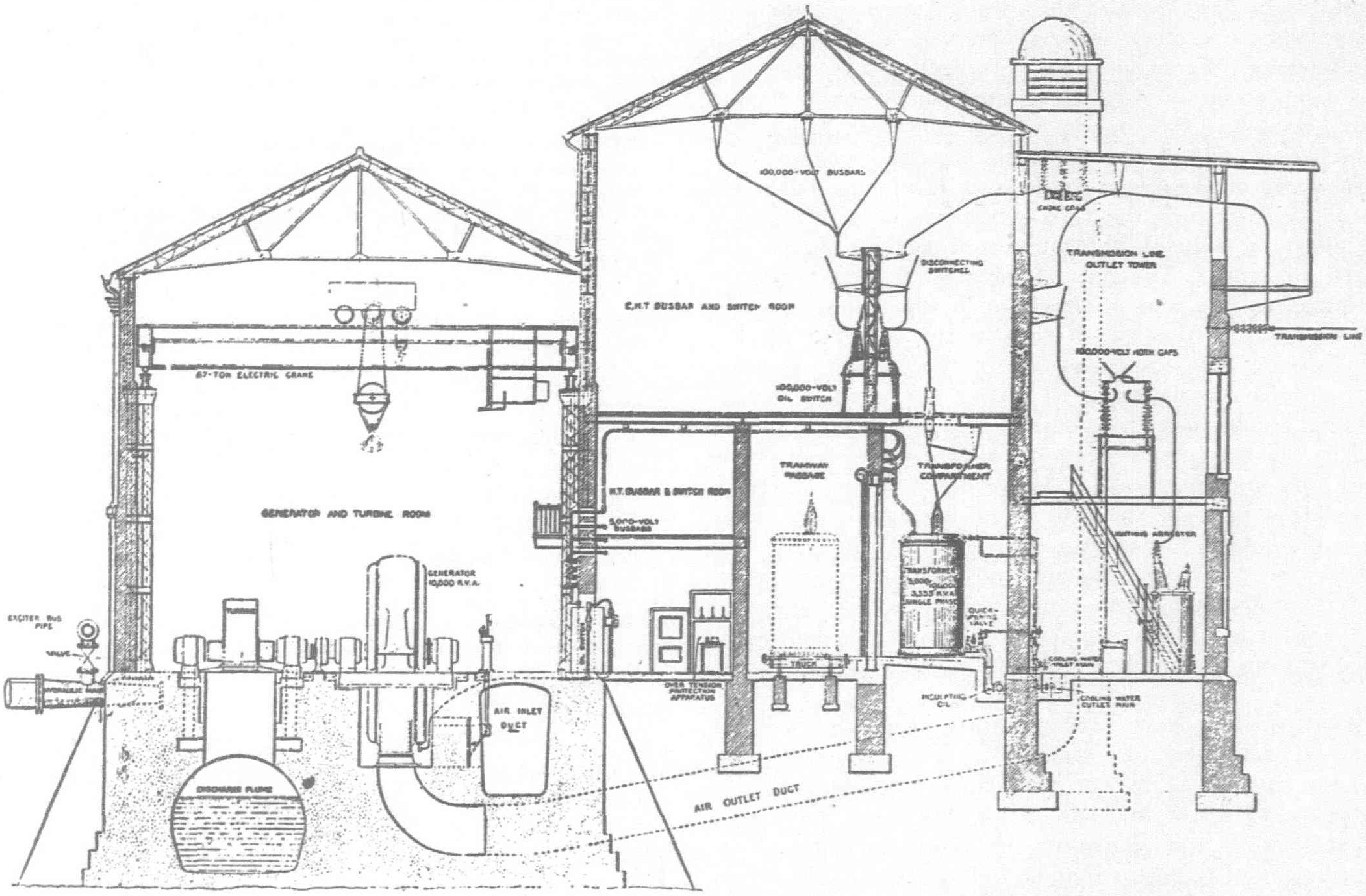
III. Dutch East Indies

In the Dutch Indies, especially in Java, there were about 30 plants fitted with turbines up to 1,500 h.p. The government is now building two power stations, viz., Tjisaroewa and Tjikapoendoeng, for which Escher Wyss & Co. are supplying five turbines of 1,500 h.p. each, with 750 revolutions per minute, three for a head of 86 m. and two for one of 104 m.

IV. New Zealand

Another land in the South Seas which has given the above firm big orders is New Zealand. Side by side with a large number of small stations, we may mention the power station at Lake Coleridge which has a head of 140 m. and which, when first built in 1912, had three units of 2,750 h.p. each with 500 revolutions. A further and similar group was supplied in 1915, but owing to the lack of power which manifested itself already in 1916, it was determined to build in a larger unit of 5,750 h.p. to which a further group of the same size will shortly be added.

These short notes will have sufficed to show the importance of the supply of water turbines for the big power stations of the Far East, and at the same time indicate the efficiency of Swiss manufacturers.



Sectional Elevation of the Khopoli Power House of the Tata Hydro-Electric Supply Company supplying light and power to Bombay. Equipped with eight sets of Escher Wyss hydraulic impulse turbines of the horizontal type (13,500 B.H.P. each) direct coupled to Siemens Brothers 3-phase generators

---

Railway Electrification in Japan

PLANS to electrify the Tokyo-Yokosuka and the Tokyo-Odawara lines are now ready to be carried out, having been signed by the minister of railways. According to a detailed account of the scheme, the new undertaking is to be fully completed by the end of the year. The cost of this project is estimated at Y.14,378,000, which the government railways of Japan is now authorized to defray out of its repairs and improvement credits.

Trains of eight cars each on the present tracks between Tokyo and Yokosuka and Tokyo and Odawara will be in operation when the lines are completed. On the Tokyo-Kozu line express or direct passenger trains are to be run with electric locomotives. The freight trains are also to be run with electric locomotives. On shunting tracks and in repair shops steam locomotives are to be used.

Electric power for this equipment will be 1,500 volts, but on the urban section the voltage is to be limited to 1,200 volts. Direct current transformer stations are to be erected near Yokohama, Ofuna and Ninomiya, the old stations to be used in supplying power to the section between Tokyo and Yokohama. The power required is to be supplied by the government plant that is soon to be completed at Akabane. Tokyo Electric Light Company is to be drawn upon in emergencies.

Eight electric locomotives have been ordered from British and American locomotive works. Thirty more engines, 60 electric cars and 90 trailers are to be built within the next two years. New sheds will be built near Kamata and Takashima-cho stations.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and
Engineering, Dedicated to the Industrial Development
and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, JUNE, 1922.

John Foord

WITH the death of John Foord, Americans in the Far East have lost the pioneer who was first to recognize, in 1898, the effect of European policies upon future American trade in China, and who brought together the leading American merchants into an association to protect national interests in Eastern Asia and bring influence to bear upon the government to take necessary action to assure that the door to equal opportunity would remain open. John Foord was the founder of the American Asiatic Association, the parent body of all subsequent American organizations for the promotion of American trade and ideals in Asia. He brought into his new work the ripe experience of a life-time of journalistic effort, a brilliant fighting record against shams and corruption of all kinds. The city of New York was a cleaner and better place to live and do business in after John Foord's memorable exposure of the Tweed ring in the columns of the *New York Times.* This stands as one of the highest examples of fearless journalism in bringing to justice the most notorious gang of political crooks that ever defied public opinion. It placed John Foord in the front ranks of political writers, a position he continued to hold until his death. As secretary of the American Asiatic Association he took the lead in all legislative and other activities for the promotion of American interests in Asia. As editor of *Asia*, the American magazine on the Orient, founded by the late Willard Straight, he has contributed to a more profound and accurate knowledge of the complex problems of this continent, at all times living up to the highest traditions and ethics of journalism.

John Foord died in New York on April 17 as the result of injuries received when he was struck by an automobile. He had reached the ripe age of 78, and was still in harness, young in spite of his years. He had well earned his rest many years ago, but continued to work and contribute his efforts to bring about an amicable solution of problems that he well realized might otherwise lead to hostilities. To those of us of a past generation who have worked with him and shared his fights for a square deal to all Asiatic peoples and promote harmony and better relations between America, Japan and China, his loss is well nigh irreparable. Americans in Asia have lost a faithful friend, stalwart champion. There are few indeed with the ripe knowledge of Far Eastern affairs to take his place in the council chambers of the various organizations that exist for the promotion of American interests and ideals in Asia.

The *New York Times* pays him the following eloquent and fitting tribute :—

> John Foord devoted a long life-time to journalism. In the beginning his field was the general news of the day. Later he turned to editing, still in the daily field, and finally his interests and his labors concentrated on the Far East, so that he will be most immediately remembered as editor of *Asia*, as one of the founders of India House and as the organizer of the American Asiatic Association.
>
> But very many years before he had brought his gifts of clear-sightedness, a sense of fair play and an ability for forcible expression to bear for the good of Japanese and Chinese, he was devoting them to municipal affairs, then of transcendental concern to New York.
>
> Born in Perthshire, Scotland, on October 12, 1844, he was educated in Dundee and spent his young manhood in the service of newspapers in London. The opportunities of a new world appealed to him, however, and in 1869 he became a reporter on *The New York Times.* He hardly was launched on his new career when *The Times* began its historic and in the end successful fight to break the Tweed ring. To his pen fell the task of analyzing the evidences of fraud in the books of controller connolly. The fight against tweed, inevitably, was not won at once, but to Foord's masterly handling of that opening assault always has been attributed a large share in the eventual success of the battle.
>
> The Tweed exposures were Foord's greatest news job. Soon after he turned to writing editorials, displaying a wide grasp of affairs and proving particularly able in what he had to say on financial and commercial topics.
>
> In 1876 Mr. Foord became editor-in-chief of *The Times,* then still a republican newspaper. He held that position until 1883 with unwavering adherence to the interests of the public and an unselfish and kindly modesty that leave him affectionately remembered by those of his associates who remain.
>
> From *The Times* he went to The Brooklyn Union, of which he became editor and part owner. Next he edited *Harper's Weekly.* For the last twenty years he was a member of the editorial staff of *The Journal of Commerce,* devoting himself to economics and international topics. His editorials on Far Eastern subjects were stamped particularly as authoritative because of his sympathetic interest in those lands, his travel and his broad reading. In the summer and fall of 1920, while in the Orient, he returned once more to the columns of this newspaper, contributing a series of signed articles on his observations.
>
> As a pioneer among broad-spirited Americans in the last generation Foord worked for fair and liberal dealing with the peoples of China and Japan. The growth of his interest in the Orient led him naturally to the formation in 1898 of the American Asiatic Association.
>
> It was at this time that German and Russian aggression upon Asia was threatening Chinese and American rights therein. The association was formed as a protest against this encroachment. Under Mr. Foord's secretaryship the association since then has steadily made its infuence felt for the liberalization of all our treaties and economic relations with the Far East.
>
> Mr. Foord was the founder and editor of the Journal of the American Asiatic Association, published from 1898 until 1917. In that year the late Willard Straight, who was president of the American Asiatic Association, agreed to finance the development of the journal into a broad general popular magazine, and he and John Foord united in organizing *Asia*, with Foord as editor.
>
> In 1914, Mr. Foord joined with James A. Farrell, president of the United States Steel Corporation, the late Willard Straight and Robert H. Patchin in organizing the National Foreign Trade Council, and a little while later Mr. Foord was one of those associated with Willard Straight in the founding of India House. His speech responding to the toast "Why India House ?" at the first dinner of the club lives as a classic in the minds of its members, and has been carried all over the world by American traders, bankers and diplomats.
>
> Mr. Foord was a thorough American also, of broad public spirit. He was very proud of his Scotch ancestry, of Scotch achievement, throughout the world. He was for many years president of the Burns Society, and invariably responded to the toast "The Immortal Memory" at the annual dinner. He wrote the foreword in the recent book "Scotland's Mark," published as a record of Scotch influence in America in connection with the celebration a while ago of "America's Making." Mr. Foord wrote the life of Andrew H. Green, one of the factors in city government in cleaning up the Tweed ring ; the life of Simon Stern, eminent lawyer and at one time president of the Bar Association ; *The New York Times Jubilee Supplement,* which chronicled the history of fifty years of this newspaper.

* * *

Japan and the Gentleman's Agreement

By Warren Ryder

THERE is a saying that if one tells a story often enough it will be accepted finally as true even by the teller no matter how little foundation in fact actually it may have. Generally speaking this saying is correct, and proof of its correctness, if otherwise lacking, may be found in the belief that has grown up concerning Japan and the gentleman's agreement. So often and so widely has Japan been accused of the violation of the terms of this agreement that the general public almost without exception has come thoroughly to believe the accusation without, of course, having recourse to any inquiry, investigation or statistical data that would tend to establish the facts.

Another factor in creating belief in this accusation has been the general public's almost complete lack of understanding of the terms and intent of the gentleman's agreement, which it has ignorantly regarded as some sort of an exclusion plan contemplating the preclusion of all Japanese immigration to America. Holding such an opinion, while observing the constant coming of Japanese to America, the public has been lead inevitably to the conclusion that Japan has not kept her promise, that she has been guilty of bad faith.

It seems well, therefore, and desirable to investigate in order to ascertain and announce the facts, but first of all to set forth as clearly as possible the terms of this much mentioned and abused agreement, as well as a brief statement of the circumstances that lead to its adoption.

The gentleman's agreement, as it commonly has come to be called, resulted indirectly from an anti-Japanese agitation in California, and to some extent in other sections of the Pacific coast, which demanded a cessation of the immigration of Japanese laborers to America. It is not in any legal sense a formal treaty or agreement, and the term applies merely to the substance of a number of informal notes, exchanged in 1907 between secretary of state, Root, and Ambassador Takahira, of Japan, discussing the subject of the regulation and control of Japanese immigration to America, and culminating in an understanding by the terms of which Japan pledged herself upon her honor as a nation to limit the issuance of passports to such of her subjects seeking to go to continental United States as fell within the following designated classes, namely :—

(1) Non-laborers ;
(2) Former residents ;
(3) Parents, wives or children of residents and
(4) Settled agriculturists.

The first class embraced only non-laborers, such as merchants, diplomats, professional men, financiers, students, travellers; and so forth, who, as before, were permitted to come and go at will. The second class embraced any Japanese, non-laborer or laborer, who sought to come to continental United States to resume a formerly acquired domicile ; in other words, any Japanese who had already become a resident of America but who had returned, or in the future might return, to Japan for a visit. The third class comprised exactly what it states, namely, the parents, wives or children of residents, firmly granting the right, therefore, of a Japanese resident of America to send to Japan for his wife, parents or children. The fourth class related to such Japanese as had already invested in farms or other agricultural enterprises in this country and who, desiring to assume active charge of such farms or enterprises, were granted the right of entry into America and have come to be referred to as "settled agriculturists." Also, Japan, of her own accord, agreed to deny passports to Japanese laborers desiring to enter territory contiguous to continental United States, such as Mexico and Canada.

From this it will be seen that while the gentleman's agreement did rigorously restrict, it did not contemplate or seek to secure the total preclusion of Japanese immigration to America and, therefore, did not amount to an exclusion act ; nor has it ever been so regarded by those informed upon the subject.

Thus having established the history, the terms and the intent of the agreement, the next step is to ascertain if—as so frequently charged—it has been violated by Japan. Regard for the facts compels the emphatic declaration that it HAS NOT, for, despite all the assertions of the anti-Japanese propagandists, I am unable to find in any of the reports of the United States commissioner general of immigration a single case wherein Japan has been shown to be guilty of any violation, but do find, upon the contrary, in these reports and in statements emanating from other official sources that she has kept the terms of the agreement. The 1919 report of the United States commissioner general of immigration makes the following statement :—" It will be remembered that the passport agreement, which was made in 1907, provides, in effect, that Japan will not issue passports good for continental United States to laborers, unless such laborers are coming to resume a formerly acquired domicile, to join a parent, husband or children, or to assume active control of an already possessed interest in a farming enterprise in America. While the agreement relates only to immigration to continental United States, Japan soon voluntarily extended the same provisions to the movement to Hawaii, so that in effect all immigration of Japanese laborers is subject to its terms. Non-laborers, of course, are not affected and are free to come and go under the same conditions which obtain in the case of aliens of other nationalities." Also, we find the acting secretary of state, Mr. William Phillips, saying in a letter to Hon. James D. Phelan, under date of August 28, 1919, that : " Adverting to your letter of July 24, relative to the so-called 'gentleman's agreement' between this government and the government of Japan for regulating the immigration of Japanese to the United States, I have the honor to say that, after giving due consideration to certain facts and figures recently obtained from the honorable the secretary of labor, I have confirmed the opinion which I have held for some time on this subject ; that is, that the present arrangement is working with a fair degree of satisfaction, with the possible exception of the immigration of so-called Japanese 'picture brides' to the United States." And in concluding the letter, Mr. Phillips says : " The number of Japanese wives coming to the United States is undoubtedly increasing but the authorities who have in charge the administration of the immigration laws have not found that the Japanese government is violating the agreement." Thus we find officials whose duty it is to know, and who have every means of knowing, stating in substance that Japan has kept the terms of the gentleman's agreement. Furthermore, the congressional committee on immigration and naturalization has just concluded a series of hearings in California and, Washington in which every phase of the Japanese situation was fully investigated and, during these hearings at which the most prominent anti-Japanese workers appeared and testified under oath, not a particle of proof, or a scintilla of such evidence as would be accepted in a court of justice, did I hear or find to show that Japan in any instance had violated the terms of this agreement. What must be the significance of this failure to furnish proof ? What must it mean ? It must signify and it must mean, it seems to me, that no proof of Japan's violation of the gentleman's agreement was furnished BECAUSE NO SUCH PROOF EXISTED ; BECAUSE NO SUCH VIOLATIONS HAD TAKEN PLACE. And it would seem to mean, also, that another of the grave charges made against the government of Japan had been predicated not upon fact but rather upon ignorance and misunderstanding.

The problem arising out of the Japanese question is a serious one. A satisfactory solution of it is greatly to be desired. But no solution satisfactory or lasting can result from an agitation that finds its chief inspiration, I believe, in race prejudice and intolerance or from a consideration that is not preceded by and based upon the fullest and fairest investigation. There has been altogether too much of a tendency upon the part of those opposing the Japanese to exercise snap judgment in the matter, to make statements without thorough investigation. Some individual, sincerely interested and no doubt desirous of giving aid to the settlement of the problem, spends three or four weeks in Japan and returns to assert a deep and fundamental understanding of the whole Japanese question, and to warn that there is grave danger of the Japanese presently overrunning the whole of America. Some other individual proceeds leisurely down through California to the Mexican border and then announces, without submitting anything by way of definite proof, that thousands of Japanese are being smuggled into California with the connivance of the Japanese government, and that if California and America are to remain white the Japanese must go. And then other individuals, whose sincerity in the premises I am not here questioning, take alarm and map out a campaign to secure legislation to exclude further Japanese from America, and to deny the fruits of their toil to those already here and the right of citizenship to their American-born children. It seems most unfortunate that this kind of activity should characterize California's contribution to the solution of the Japanese problem.

* * *

The Chinese Eastern Railway

By Shao Ying T. C. Yeh

(Out of the mass of publicity matter circulated in the United States by the Chinese delegation during the Washington conference, the following presentation of China's side of the case in the matter of control over the Chinese Eastern Railway is of special interest and value).

THE construction of this railway was undertaken in pursuance to the agreement reached between the government of China and the Russo-Chinese Bank in 1896. Under the provisions stipulated therein, it was agreed that "China and Russia establish a company to be called the Chinese Eastern Railway Company to construct and manage this railway." "The shares may be bought only by Chinese and Russians. In the imperial sanction given to the Chinese envoy empowering him to negotiate the matter, the company was accorded concessions, privileges and facilities, in return for which the company was to pay to the Chinese Government five million treasury taels on the day the line is completed and traffic commenced." The line was to remain the property of the company for eighty years from commencement of traffic, at the end of which it would revert to the Chinese government without payment. China is given, however, an option to take it over at the end of thirty-six years on payment of all capital, debts and interest owed by the company and undistributed profits, if any.

During the disturbances of 1918, allied forces were sent to Siberia to maintain order and assist in the evacuation of the Czecho-Slovaks there. To facilitate the evacuation, and inter-allied commission was created to take over the administration of the line. This arrangement provided for a technical board and a military transport board comprising of a representative from every nation that had a force there,—including one from the Russian government, which issued a declaration in approval of the arrangement—Both in this declaration and in the one issued by the allied representatives, emphasis was laid on the fact that, in doing so, it only intended to facilitate and improve the railway, and no violation of Russian sovereignty was contemplated. Although stipulation was made for the dissolution of this body upon the withdrawal of the allied forces, the railway is still under its management to-day.

A careful study of the relation between the company and the Russian imperial government clearly shows the political rôle of this railway with the inevitable disadvantageous results to its commercial standing. The losses were at first made good by the funds of the Russian government, but when the Bolshevik *coup d'etat* did away with the board of directors of the company at Petrograd, it was deprived of the only financial prop on which the company has been relying. The result was disastrous. This was further aggravated, first by the political interest of some of the directors such as General Horvath and Vice-Admiral Kolbchak, then by the enormous depreciation of the rouble and lastly, but not the least, by the struggle of the various political factions in Eastern Siberia and the consequent disorder along the line, a natural result of guerrilla warfare.

Such strifes were not only detrimental to the Russians themselves but were gradually affecting the safety of the Chinese. China suffered under this state of affairs as long as it was compatible with her own duty towards her subjects. The time came at last when any further inaction on her part would endanger her own security, and after consulting her allies she joined them in sending an expeditionary force into Siberia to assist in maintaining some sort of order there.

When the inter-allied commission came into existence, China opposed the inclusion of the Chinese Eastern Railway under its administration. The protest, however, failed to have any effect.

The reasons on which China based her claims for the sole administration of this railway can be summarized as follows :

(1) The line is on Chinese territory. The lands through which the line runs and the adjacent land are grants to the Chinese Eastern Railway Company by the Chinese government, free of charge. It is, therefore, only just that its administration by any other party besides Russia, to whom China is bound by treaty, can only be interpreted by China as derogatory to her territorial integrity.

(2) China is one of the two principal shareholders. By virtue of the agreement of 1896, "Russians and Chinese only can be shareholders." As a matter of fact, the Russo-Asiatic Bank remains the sole shareholder of this company with the exception of very few individual shares. But this bank is a joint Chinese and Russian concern, the former having subscribed and paid up the sum of Tls. 5,000,000.

(3) China is a creditor of the company. According to the agreement of 1896 the company was to pay to the Chinese government the sum of Tls. 5,000,000 in return for the land granted to the company by the Chinese government. This, for some reason or other was never carried out, and together with interest it now amounts to something like Tls. 11,000,000.

(4) By the agreement of October 2, 1920, signed between the Russo-Asiatic Bank and the ministry of communications, it was stipulated that, pending an agreement between the Chinese government and the future Russian government recognized by China, China will assume the control over its administration in order to give it efficient protection. China therefore, is in honor bound to make good the promise she has given to the bank.

(5) Since the Chinese assumed control of the railway its financial conditions have been greatly improved. Instead of relying upon Russian government subsidies to make up its enormous deficit as had been hitherto the case, the revenues and expenditures are now almost balanced.

In claiming administration over this railway, China is not only actuated by her own interests but also by consideration for the welfare of the company. This can be easily proved by a careful study of the agreement of 1920, a provisional understanding pending the constitution of a recognized Russian government. It contains no special derogations of the statutes of the railway company as of the 1896 contract, which were confirmed. To guard against possible abuse it contained a special clause confining the activities of this line to those of a purely commercial character. All these facts demonstrate clearly that, beyond protecting her own and the company's interests, China has no intention to take advantage of the present Russian situation, although it would be quite justifiable, seeing that the Tls. 5,000,000 to be paid by the company stipulated in the original agreement was never paid up.

As soon as a stable government is established in Russia that can take over the rôle now forced on China, negotiations for a settlement will no doubt be arranged at the first favorable opportunity. The matter in short, is one between China and Russia and to be settled between these two countries when China can find a recognized government to deal with in Russia. That this is clearly acknowledged by Russia herself can be seen from the aforesaid agreement.

It may be added here that the inter-allied commission was called into existence by reason of military exigencies. Now that all the allies except Japan have seen fit to withdraw their forces, it has outlived its usefulness. Why not dissolve it and prove to the Russians as well as the Chinese the good faith of the allies as stated in their declaration in 1918 ? To the Russians, this will mean the fulfilment of a promise eagerly awaited ; to the Chinese, its termination will mean the ending of what has always been considered a gross violation of their administrative integrity and territorial sovereignty.

In view of the above considerations, China is prepared to bear on her own shoulders the whole burden and responsibility of continuing to maintain the efficient administration of the railway as long as Russia is not in a position to do her share. Any interference on the part of others will be, therefore, not only unjustifiable, but detrimental to its continual smooth working. We have not the slightest doubt that such a course of action will be met with the disapproval, not only of the Chinese, but also of the Russians, whose interests China is bound by treaty to uphold and protect.

Shao Ying T. C. Yeh.

* * *

The latest financial report of the Chinese Eastern Railway under the presidency of Dr. C. C. Wang, indicates that the financial stringency of the line has been much eased owing to payments made by the various powers for services rendered during the war and post-war period. In effect, the railway showed a net profit of more than $2,000,000 for 1921 after paying for many improvements. According to the latest reports, the amounts owed by the powers to the railway are as follows :

Country	*Original amount owed*	*Outstanding*
Japan.. ..	$6,544,249	$247,874
Great Britain ..	358,016	48,565
U. S. A.	659,310	91,451
(American merchants)	469,376	469,376
France	452,690	452,690
China	182,177	182,177
Italy	56,759	10,115
Czecho-Slovakia ..	3,477,650	3,477,650
Others	273,334	273,334
Total ..	$ 12,473,561	$5,253,232

* * *

The Value of an Ounce of Gold?

IN 1913, Dr. Sun Yat-sen damaged his political career in China by advocating a currency scheme guaranteed by merchandise and the products of the country stored in government warehouses. Overnight, he fell from the pinnacle of fame into a padded cell. Ten years later, the total gold reserves of the world are computed at $5,000,000,000, of which, sixty per cent. is in possession of the United States with the inter-allied nations in her debt to the tune of $19,000,000,000. With the gold mines of the world closed down because it is now unprofitable to work them, and with only about a dozen mines with ore reserves ahead of them for twenty years, with the United States draining the world of its gold in payment of debts, the question must arise of how these debts are to be paid. Obviously, if they cannot be paid in gold, if paid at all, they must be paid in commodities, which in turn must have a fixed value.

Now comes Thomas A. Edison and asks the simple question : "what in your opinion would be the approximate market value of a troy ounce of pure gold if all the governments of the world should demonitize it ? "

What is the answer ? What regulates the price of gold ? The current belief is that gold is subject to the law of supply and demand the same as other commodities, or that an ounce of gold is worth a certain price because it costs just so much to produce it. The price of pure gold is $20.67 per troy ounce, simply because the nations of the world have fixed that price as standard. Nothing more, nothing less. Gold in itself is the most worthless of all metals, its value being limited almost entirely to monetary and ornamental purposes. In 1492, the year America was discovered, the total stock of gold in Europe, in plate, jewelry and coin was estimated at about $600,000,000. Since the discovery of America, about 18 billions of the yellow metal have been added to the reserves of the leading nations of the world. Of this amount fully one half was plundered from the nations of the new world in the fifteenth and sixteenth century. Of the total amount, less than one half exists to-day. Every ounce of gold in the world has cost a human life. During the last ten years, the annual gold production of the United States has been reduced fully fifty per cent. What has an ounce of gold cost ? More than it is worth in dollars, besides untold cost in human blood and tears.

If Europe is steadily drained of its gold reserves, with no money acceptable to the United States except at ruinous rates of exchange to pay for the things bought from us, with no credit for the supplies and materials she needs, unable to pay what she owes, in many cases not even the interest due, how can America sell her surplus and Europe buy from America. America has too much gold and Europe has not enough. Yet America demands more and more gold in payment for her commodities, and Europe is unable to buy, with the consequence that we are passing through a business depression as acute as that which exists in Germany. America is suffering more than Europe is. The whole world is thereby financially disarranged.

If is is impossible to settle the debts of the world with gold, why should not money or credits be based on "capital goods," land, industries, mines, as well as gold reserves ? Why should not the bonds or guarantees of a nation be as good as the nation itself, that the "will to pay" as well as the ability to produce goods of value, be acceptable as gold in settling these debts ?

The United States has sixty per cent. of the gold reserves of the world but is suffering from an acute stagnation of business. If large gold reserves mean prosperity then not a man should be idle in the United States. Germany, with depleted gold reserves and billions of paper money has less idleness than the United States. If mere volume of money means prosperity, then Russia should be enjoying the "golden age." How can the nations of Europe reduce their paper issues without demoralizing their industries and how much gold would be required to stabilize Europe's paper issues, and, what is more important, where is all this gold to come from, when it is all flowing one way ?

There may be a solution to this world problem along lines that will maintain the gold standard, but we fail to see how it is to be brought about unless the United States is willing to accept cancellation of some of the war loans or some rearrangement that will shift the load from Britain and France on to her own shoulders. We are approaching the time when the ideas of Dr. Sun Yat-sen may have to be seriously considered as the only way to bring about world stability, in which commodities, merchandise, natural products, necessities of life, etc., will serve as a basis of values. For if Europe is to pay at all she must pay in trade. If this is so, America and the neutral nations of the world must suffer through business depressions.

* * *

International Good Manners

"IT is our duty to so direct the foreign relations of our country that the power of public opinion shall be for peace. More quarrels have come from insults than from injuries," declared Eliju Root in his San Francisco address. *The New York Times* editorially takes up the advice of this sane old American statesmen, and says that "behind and superior to formal diplomacy and official negotiation between governments, the condition precedent of a successful working of the best-devised machinery for composing international controversies and averting war is the will, the steady purpose, of each people to maintain peace, so far as possible. As Mr. Root said in his San Francisco address: 'It is our duty so to direct the foreign relations of our country that the power of public opinion shall be for peace.'

"The old dynastic, intriguing, conscienceless diplomacy is gone for the most part. The more "open" form that succeeds it may be made less powerful for good by the violence of public men and newspapers that roar and rage for their own purposes against some foreign nation or nations. So far as these continuous discharges of suspicion, hostility and falsehood have their effect, they beget or increase at home a misinformed and embittered feeling which is responded to abroad by a quickened and growing and dangerous resentment.

"In the close intercommunication and interpenetration of modern states, a wealth of disputes, misunderstandings, claims and counter-claims is inevitable. They can be settled amicably in the spirit of conciliation, compromise, friendly give-and-take. Representatives of the nation can get together "to talk things over," as Mr. Root says. "If there is a controversy, the most important thing is to get some one to change his mind." Meanwhile, all the purple-necked orators and organists of ill-will have been doing their best in both countries to create an inflamed state of the public mind. They are a minority, but in each country the influence of the rancorous faction in the other is apt to be overestimated.

"More quarrels," continues Mr. Root, "have come from insults than from injuries. If democracy is to conduct foreign affairs without taking the nation into strife, it must not give cause for resentment in the minds of other peoples." That is, democracy must improve its international manners. Ambassadors treat one another as gentlemen. The sovereigns they represent, the sovereign peoples, must do the same. Good temper, moderation, avoidance of heated and insulting language should prevail. The United States, in particular, should act in accordance with its power, dignity and responsibility.

"It should be understood," Mr. Root frankly declares, "that the American people will taboo loose and unfriendly talk about the people of other nations, and such punishment"—the withholding of votes from disturbers of peace—"will be the first step in our conduct of foreign affairs." The taboo can't be imposed too soon; and it is refreshing to hear Mr. Root making this needed plain talk in the hunting grounds of Chief Hiram."

* * *

Political Agitation Affects Trade

THE aftermath of the Japanese boycott agitation in China and the campaign against the Anglo-Japanese alliance, in which British traders were also menaced by a boycott if the alliance was extended, is being revealed as the statements of conservative British business men are made public. The movement started in China was carried to India; the club which whacked the Japanese was held over the British in the same identical manner, and with equal injury to legitimate trade. In destroying Japan's trade in China, British subjects who worked in close co-operation with other foreign leaders in inciting the Chinese to a boycott, failed to grasp the fact that two can always play at the same game. Japan paid the price of this campaign, and can now sympathize with the British.

The conditions in India arising from this boycott are summed up by Sir Montagu Cornish Turner, the chairman of the Chartered Bank of India, Australia and China in his speech at the last meeting of the shareholders held in London on April 5th. After setting forth the satisfactory balance sheet figures, which permitted the payments of a dividend of 14 per cent., together with a bonus of 6s. 3d. per share, making with the interim dividend, a total of 20½ per cent. per annum free of income tax, the chairman said:

"The year 1921 has been one of considerable anxiety, of hope deferred, of frequent disappointment, and of unavoidable losses to most of those trading with the East. In India the absorption of accumulated stocks, which might reasonably have been anticipated, has been hindered by two principal causes. Political agitation, with unfair pressure on innocent traders, has at many points been exercised to prevent consumption of British goods—an agitation which should never have been permitted to assume the proportion it attained."

In this conservative statement the chairman of the Chartered Bank corroborates other reports on the injury to British trade by the spread of methods that were so successfully applied in China to penalize the Japanese. Continuing, he said:

"As regards the position in India generally. I am disposed to take the view that, provided the government of India act consistently with firmness and justice—as I believe they will—there is no reason to view the situation with undue apprehension. In all parts of the world—East and West, even in England itself—we see a widespread spirit of restlessness and discontent. There is a craving for change, a desire to attain what is in many cases unattainable, and a tendency to oppose all existing forms of government. This is an aftermath of the great war, and only time, with universal peace and goodwill, can bring about the contentment and good fellowship which should prevail between nations and between the component parts of those nations. This is especially applicable to India, and I look forward with confidence to the time when we can say that the people of India are showing that spirit of loyalty, comradeship, and goodwill which should exist between all members of the British empire. But to effect this we must have consistency in policy and firmness in administration. I do not deny that there are troubles at some points—serious troubles—in India, but they are partly agrarian, and can be dealt with by a just and firm government. The conclusion of a peace with Turkey on liberal lines, as recently outlined by Lord Curzon, will also help to alleviate the present strain."

In regard to trade conditions in China, Sir Montagu added:

"In China the offtake of imported goods has also been interfered with by extremely unsettled conditions in the interior of the country, and by the comparatively low rate of exchange. Serious losses have resulted, but the position has improved of late, and stocks are moving off gradually. Some time must elapse, however, before the position of the import markets either in India or China can be regarded with equanimity. Summarising the position of the Eastern markets generally, we may say that, while export markets mainly show very little life, import markets have improved to the extent that accumulated stocks are being gradually worked off, but it would be absolute folly on the part of shippers on this side to pour in fresh supplies which are not needed. The motto for all of us should be 'slow and sure' until the dark clouds of depression have disappeared, and the purchasing power of consumers has attained more nearly to normal levels."

* * *

Root on China

(From the presidential address by Elihu Root before the sixteenth annual meeting of the American Society of International Law, Washington, D. C., April 27, 1922.)

"THE four-power treaty was not enough, however, standing by itself, to make the new condition stable without some treatment of the causes of irritation which had arisen and which might be apprehended upon the continent of Asia. For the discussion of this subject four other powers having interests in the Far East, Belgium, China, the Netherlands and Portugal, also took part . . .

"Under the conventional arrangements with China there had developed a vast extent of beneficial trade and industry upon which multitudes of people in and out of China were dependent. It was evident that to attempt then to wipe out all the arrangements which I have described and put China immediately upon the footing of a full member of the society of nations unhampered in her trade, her administration, and her maintenance of order, except by the rules of international law, would be futile and disastrous, for there was no government in China competent to maintain trade, to administer justice to foreigners, or to protect foreign life and property. It was evident, too, that China must work out her own salvation, that no exercise of foreign power could accomplish the result. Four hundred and thirty million people are too great a mass to be reformed from the outside. If China is to possess her own territory with independence and control of her own destinies, she must learn to govern herself and to assert and maintain her own rights as a nation.

"Accordingly, the members of the conference addressed themselves to the task of helping China so far as it was possible in her struggle to achieve self-government . . .

Any one examining the treaties and resolutions will find that they uniformly sought a double object, first, to relieve the limitations and inconveniences flowing from the old conventional relations as far as was then practicable under the existing governmental conditions in China, and, second, to afford to all sections and parties of the Chinese people a helpful incentive to unite in the establishment of an effective and stable government by making specific provisions under which such a government, competent to perform its national duties, will be the means of bringing China into the full possession of the rights and liberties assured by international law to the members of the family of nations, just as Japan has been brought into that family.

"Personally I am a believer in the coming of that event. It will be a long, difficult process, for it requires the new education of more than four hundred million people, but I look to the future of that industrious, kindly, peaceful people, with their inveterate respect for individual and family rights, not as a yellow peril but as a great reinforcement, to the power of ordered liberty upon the domination of which the future of our civilization depends."

* * *

Don't Overlook Publicity!

THE Pennsylvania bankers' association is alive to the fact that *foreign trade constitutes a most important factor* in the permanent prosperity of the nation; that all must co-operate in the effort to develop it along safe, permanent and profitable lines. Such co-operation demands accurate information and quick service, and should be carried out with the idea of promoting friendly international relations along lines that make for peace. A foreign trade policy based upon sentimental regard for one nation while antagonizing another rich and profitable customer, can bring no lasting or beneficial results.

The Pennsylvania bankers' association were quick to sense the meaning of the Washington conference and the opportunities now before the nation to extend its foreign trade, and to this end organized a committee headed by Dr. J. T. Holdsworth, vice-president of the Bank of Pittsburg, who, by reason of his intimate grasp on foreign exchange problems, is recognized as one of the foremost experts in this field. In a very concise statement, Dr. Holdsworth spoke more truths than we have seen in the many recent papers which purport to emanate from foreign trade authorities, and concludes by saying that what Americans need is a fresh baptism of grit, initiative, perseverance and courage, and be ready to co-operate heartily in the development of their export and import business. And we will add something that Dr. Holdsworth overlooked, and that is, to be successful the American business man, banker, trader and manufacturer must make up his mind that one of the essential cogs in the wheels of trade is publicity, without which, he will get nowhere in the struggle for markets. Unless the American manufacturer supports an American publication that is carrying his load in foreign fields, he cannot hope to have his interests at all times defended as they should be. Without this whole-hearted support, an American publication cannot exist. Publicity, and the defense of national policies in foreign fields, is as much as part of the machinery of successful trade as the bank, broker, commission house or transportation line. Without that publicity and the sympathetic co-operation of newspapers designed to assist national trade, it is a very easy thing to lose the hold on a foreign market.

* * *

None of Our Business

THE following editorial from the "Official Organ of the American Chamber of Commerce for Brazil" is worth reproducing, for the benefit of foreigners in China. The Chinese must work out their own destiny in their own way. It should not concern any foreigner how she does this, or what party, leader, or policy wins in the present difficult period of unification. When the United States was engaged in settling its internal problems during the civil war, several European powers whose trade was disarranged attempted at various times to bring about conciliation. This finally led to a notification from President Lincoln to the powers concerned, that any overtures having for their object peace between the north and south, would be considered as an unfriendly act. China is entitled to the same consideration in settling her affairs in her own way. It is emphatically none of our business :—

> "The political campaign, which is absorbing the attention of our Brazilian friends at present, comes closer to being none of our business than anything of which we can think, off hand.
>
> "There are many lines of activity in this country which may be considered of legitimate interest to resident foreigners, but the election of the president of the republic is not included.
>
> "The more or less painful labors, through which not only Brazil but every republic passes in the production of a new administration constitute a phenomenon which should be in no way unfamiliar to Americans. No one should be able to realize more acutely than an American that political campaigns generate heat and super-sensitive nerves. No one should be better able than an American to understand the resentment that is invariably aroused by 'the foreign vote.'
>
> "A considerable number of Americans, as well as other foreigners, who have been decorated with wooden crosses in Mexico and Central America, would probably have been alive and prosperous to-day if they had not butted into local politics. The fact that they are now 'At Rest' indicates former ill-placed activity.
>
> "One evil result of the assumption of a partisan attitude by any one American is that it may become noised about that such is the position of 'the Americans.' The acts of one fool foreigner may be sufficient in these times of stressed sensibilities to place a highly undesirable odium on his fellow countrymen.
>
> "The facts and conditions which have raised the present political issues are but partially understood by foreigners, but one fact which is fairly obvious to even the most casual observer is that the Brazilians are capable of handling their own affairs fully as well as most peoples.
>
> "Between now and next March, while the Brazilians are whooping it up for their candidates, there is an excellent opportunity for resident foreigners to confine their attention to their own business—if they have any."

* * *

Peking and the Consortium

MR. Hall's excellent article on the financial program of the new Peking cabinet would indicate that the day is drawing nearer when the consortium deadlock must be broken and negotiations initiated to relieve China's distressing financial situation. However, some time will elapse before the dreams of Peking can be realized. The first requisite to a foreign loan is unification, followed by recognition of the consortium by the Chinese government. As matters stand, the joint note from the British, American, French and Japanese legations at Peking to the Chinese foreign office transmitting the consortium dossier (dated September 28, 1920) remains unacknowledged. The first move after unification, is therefore an official acknowledgement of the friendly note of the powers, which explains in full the surface reasons for the creation of the consortium. Then, once a basis for official negotiations is established, all communications, conversations and conferences must be conducted openly and above board by the duly authorized minister of finance or his delegates. The day is passed when such negotiations can be carried on in secret by intermediaries. When these preliminaries are carried out, there is little doubt that the consortium will be ready to do business along lines that will safeguard not only the interests of China but those of the bondholders

Any premature attempt to negotiate a re-organization or funding loan before China is reunited would be fatal. As a matter of fact, such a loan could not be issued in the United States with any chance of success. It is only necessary to point out that the Canton government maintains a very intelligent and highly efficient publicity organization in Washington and that nine-tenths of all Chinese resident in America are active sympathizers with and contribute funds to the cause of Sun Yat-sen. The parades of protest and general hullabaloo on their part, coupled with a vigorous publicity campaign last year against the then suggested loan to Peking, warns us that such activities would be redoubled. Americans would be told that they were sacrificing republicanism or democracy to a military autocracy, and there is little doubt as to the effect of such arguments upon a people who view these problems largely from a sentimental angle. A loan to Peking, if made at all, would have to be carried by the bankers, with the prospect of it being repudiated at some time in the future. Obviously, American bankers would hardly care to assume responsibility of carrying the load of a long-term Chinese issue under such conditions, even if we admit that the state department would sanction it.

There is no more reason to believe that any of the other groups would interest themselves in a loan to the Wu Pei-fu cabinet unless the south is brought into line through reasonable compromise. Notwithstanding the inclusion of the Nishihara loans in the proposed refunding plan, which, we are told, is due to the desire of Wu Pei-fu to release China from any obligation to Japan, it is extremely doubtful if this would induce the Japanese government or its group to forego their fixed policy to refrain from financial intervention in China until unification is accomplished. Japan will take no more chances in financing any faction in temporary control of Peking, and if the readiness of Wu Pei-fu to recognize loans which his party have repudiated to date, is intended to influence

Japan into approving a loan pending unification, he will probably be disillusioned. Japan has greater interests at stake in the pacification and unification of the country than in the repayment of a loan of $180,000,000.

We have been informed that the British group has sent out encouraging feelers to the new government and that if a loan is made to the Wu Pei-fu cabinet it must be on their initiative. Obviously, *the wish here is father to the thought. Conditions* have changed since 1913, and it would be now impossible with America in the consortium to repeat the mistake of the reorganization loan which cemented Yuan Shih-kai's power as a military dictator and made possible the creation of the Peiyang military oligarchy. The Kuomintang cannot be eliminated and brushed aside as it was in 1913, without creating a split that would endanger the existence of the consortium and undo all the good work that has been accomplished to bring about international co-operation in the solution of China's difficulties. Public opinion in the United States, in Japan, in Great Britain itself, would not countenance another such unwarranted interference in the internal affairs of China. The South, and what it stands for, is a vital element in the present struggle and those who advocate a loan to the Wu Pei-fu cabinet should remember that this is China's problem, in which no other nation has the right to interfere. If unification again brings the Kuomintang into a position of power, and it fails to live up to the required standards, it is China's funeral. A loan that ignores this elementary factor in China would only tend to defeat its purpose and invite a continuance of the differences which have prevented a return to normal conditions in this country. For these reasons we believe that the stories circulated about the encouraging attitude of the British group towards financing Wu Pei-fu's funding loan are without foundation in fact, part of a propaganda to create a sentiment favorable to such a procedure.

China is making progress. There is no doubt of that. If left to themselves, the Chinese will find some solution to their difficulties acceptable to their own conception of what is right and proper.

* * *

Japanese Railways 1921

FROM the point of income alone the business of the Imperial Government Railways has been steadily increasing since the beginning of the great war. The reasons for this increase are, however, largely to be found in the increased mileage of tracks and the greatly increased charges for freight and passenger services. Thus while on the surface the results of operation were exceptionally good, an examination of the actual business fails to sustain the actuality of the improvement during the years of Japan's war prosperity.

For instance, in 1914, the average number of miles of track in operation was 5,538; in 1921 this had increased to a little more than 6,600 miles, by slightly more than 20 per cent. But passenger fares were raised on July 16, 1918 by 50 per cent., and again in February 1920 by 50 per cent. of the fares charged in 1918. Freight rates were raised by 20 per cent. on September 15, 1918, and on January 10, 1921, the classification of freight was revised in such a manner as to raise the average rate by 28 per cent. Compared to before the war freight rates, this was an increase of 53.6 per cent. Considering the natural effects of these increased rates on aggregate income as well as the increased business brought about by the extension of operated lines, the rise in income since the beginning of the war is not particularly extraordinary.

Passengers Carried Increasing Annually.—Statistics of passenger business show that the number of passengers carried on the Imperial Government Railways has been increasing every year between 1914 and 1921, and a comparison of the traffic in the two years shows the passenger traffic of 1921 to be 2½ times greater than that of 1914.

TABLE I.

Passengers carried and Passenger Income 1914-1921.

	No. of Passengers	Increase compared to previous year. Per cent.	Income Yen	Increase compared to previous year. Per cent.
1914 ...	166,090,000	—	44,670,000	—
1915 ...	172,290,000	3.7	57,280,000	4.7
1916 ...	197,040,000	14.3	64,770,000	13.1
1917 ...	245,240,000	24.4	84,730,000	30.8
1918 ...	269,590,000	9.9	120,750,000	42.5
1919 ...	331,120,000	22.8	162,820,000	30.0
1920 ...	378,550,000	14.3	204,710,000	25.7
1921 ...	418,000,000	10.4	211,540,000	3.3

In this manner traffic has increased, but the passenger fares have also increased. Since 1919 both the rate of increase in passengers carried and in income has been steadily falling, indicating that the number of passengers traveling short distances has increased while the long distance travel has fallen off materially.

Freight Business

Along with a steady increase in the tonnage carried income from freight traffic has shown a steady advance for several years past, but the class of freight carried has recently shown a great change.

In 1915 there was a material falling off in freight carried. In 1914 the Imperial Government Railways handled 35,700,000 tons, but in 1915 the total freight carried was only 34,160,000 tons, a decrease of 43 per cent. In 1916 the business of the country began to feel the effects of the growing war prosperity and there was a considerable increase in the tonnage offering. For the first three months of 1916 the average tonnage carried was 3,000,000 tons a month; for the last three months, 3,750,000 tons a month. The year's total tonnage was 40,000,000 tons; monthly average, 3,270,000 tons. Compared to 1914 this was a 12 per cent. increase.

With the continuing growth of war prosperity the tonnage carried rose year after year until during one month in 1919 the total carried reached 5,000,000 tons.

In the second half of 1920 the effects of the great panic caused a sudden falling off in tonnage. Until May, 1920, the tendency was towards increased freight business, tonnage that month reaching the highest amount ever known on the Japanese railways, 5,140,000 tons. Thereafter there was a most decided falling off. From 1915 on there had been an annual increase of 14 to 15 per cent., but when compared to 1919 tonnage in 1920 showed a falling off about 5 per cent.

The total tonnage moved in 1920 was 53,750,000 tons. This fell in 1921 to 52,100,000 tons, a decrease of 4,000,000 tons compared to 1918, about 7 per cent.

Freight Moved on Imperial Government Railways 1913-1921.

	Tons
1913	35,079,000
1914	35,704,000
1915	34,168,000
1916	39,294,000
1917	45,549,000
1918	50,730,000
1919	56,206,000
1920	53,751,000
1921	52,105,000

Freight According to Classification.—The greatest decline in tonnage has been in the amount of coal moved. The decrease in the total tonnage moved in 1921 compared to 1920 is 3 per cent. But the decline in coal tonnage moved was more than 11 per cent., so that the real reason for the falling off of total tonnage in 1921 is to be found in the decline of the coal trade. Coal was 34 per cent. of all cargo carried in 1919 and 1920, but in 1921 it was only 31 per cent. of all cargo, a decline of 3 per cent., the actual percentage of the falling off of all tonnage.

Because of the extremely bad condition of all manufacturing industries, the nation's coal consumers, no early revival of the coal trade, and consequently of the coal carrying trade, can be expected.

After coal, in 1921, the greatest falling off of tonnage is seen in ore, iron and steel, salt, stone, building materials, cement and raw cotton. These commodities have made the greatest tonnage decreases, but compared to the falling off of coal tonnage, their declines are all small. In 1921, however, certain commodities showed noticeable increases in tonnage; rice, limber, fertilizers, charcoal, fresh fish, paper, Japanese and foreign; cotton cloth and yarn, sugar, kerosene, and *saké*, when compared to their tonnages moved in 1920.

Most Important Commodities carried on Japanese Railways:

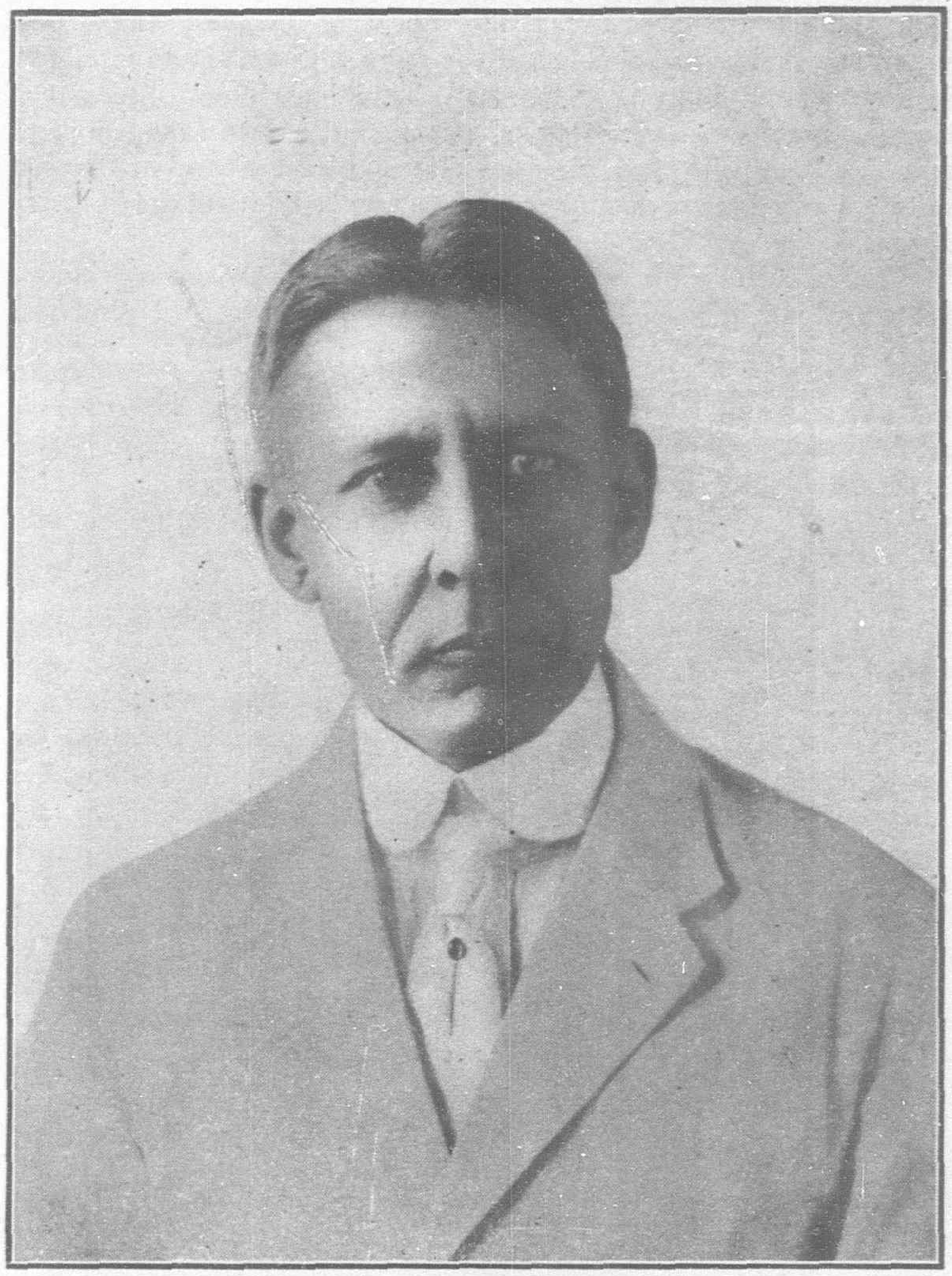
	1921 Tons	1920 Tons	Increase or decrease Tons	Rate Per cent.
Rice	2,392,000	1,957,000	435,000	22
Lumber	5,158,000	4,984,000	174,000	3
Ores	680,000	767,000	87,000*	11
Coal	16,868,000	18,326,000	1,958,000	11
Iron and steel	614,000	633,000	19,000*	3
Fertilizers	2,260,000	2,016,000	245,000	12
Charcoal	1,281,000	1,094,000	187,000	17
Food salt	455,000	461,000	6,000	1
Fresh fish	458,000	326,000	132,000	40
Paper(foreign & Japanese)	355,000	205,000	149,000	73
Dried fish	307,000	221,000	85,000	39
Cotton yarn and cloth ...	654,000	375,000	279,000	74
Wheat	550,000	472,000	79,000	17
Fresh fruit	319,000	289,000	30,000	10
Fuel wood	571,000	513,000	57,000	11
Stone building material	704,000	705,000	1,000*	—
Sand and pebbles ...	2,590,000	1,588,000	1,001,000	63
Petroleum, etc.	516,000	470,000	43,000	9
Sugar	373,000	280,000	93,000	33
Alcoholic beverages ...	626,000	415,000	210,000	51
Cement	553,000	559,000	6,000*	1
Raw cotton	241,000	248,000	7,000*	3
Grains	314,000	305,000	8,000	3
Others and total... ...	52,175,000	53,662,000	1,487,000*	3
Income	Y.161,571,000	Y.126,932,000	Y.34,639,000	26%

*Decrease.

A Scientific Products Laboratory for China

IT is universally conceded that the greatest achievement of American rule in the Philippines was the establishment of the bureau of science with its wonderful record of efficiency in investigating tropical diseases and discovering and applying new remedies and serums which kept down the death rate of the people and prevented plagues which yearly decimated the domestic animals. From the start, this bureau held the attention of and won the highest praise from the world of science for the thoroughness of its studies, conclusions and reports. The latter stand as the most valuable collection of records of research into tropical science that exists to-day, a permanent testimonial to the painstaking care of those who conducted the investigations and drew up the reports. Manila, the islands and the Far East in general, are heathier places to live in as a result of the labors of this group of American scientists, under the capable direction, first of Dr. Paul C. Freer, and later on of Dr. Alvin Cox. The bureau of science with its wonderfully equipped laboratories was the foundation upon which the health service of the islands was erected, the pride of the American administration, the sign of our progress and civilization. One of the results of the Harrison administration was to create conditions that caused the retirement of Dr. Cox and make the bureau more and more dependent on Filipinos, with the same results that characterized their administration of other important bureaus. The loss to the Filipinos may have resulted in a gain to China. It brought Dr. Cox to this country with the idea of investigating the possibility of establishing a commercial laboratory in Shanghai that would do for the Chinese what the bureau of science in Manila did for the Philippines.

Without minimizing the good work along these lines accomplished by others, or detracting in any way from the merits of foreign manufactured products which find a large and increasing sale in this market, it is fair to state that the necessity of such laboratories is a crying need in China. It is a virgin field, vast in its possibilities for scientific research. Strange and rare diseases unknown to Western medical science call loudly for special scientific investigation and the discovery of remedies and serums to combat their ravages.



Dr. Alvin J. Cox,

Formerly Director of the Bureau of Science in Manila

There is not only great need of, but an excellent commercial opportunity for, an institution that will specialize in the common products which hold a real and permanent place in the materia medica, such as vaccine virus, antidysenteric, antitetanic, antidiphtheritic and normal horse serums, and antirabic, gonococcus and autogenous vaccines, etc. Such an institution will be a great boon to China.

In normal times, the government of China would no doubt co-operate in facilitating the manufacture of biologic products and other similar enterprises which have a distinctly governmental significance. It should be an easy matter to prove to the government the value of establishing vaccination headquarters in each province, and reduce the ravages of smallpox in China to almost nil. Vaccine virus for the vaccination of 400,000 000 people would be a large order, taxing the capacity of all the laboratories in the world to fill. Yet some day China must come to it, the same as all other nations, and the vaccine will be supplied from laboratories established in China, if the order is to be filled.

WU PEI-FU'S FINANCIAL PROGRAM

By Josef W. Hall

IT has been years since China has undergone a political overturn of so sweeping a nature. More important than the eradication of the dominance of Chang Tso-lin from Chinese national affairs is its by-product: the turning out of the old mandarinate from Peking, which has culminated in the retirement of President Hsu *Shih-chang. This has a direct bearing on financial matters* inasmuch as it means the end of the reign of the Chiaotung clique in government finance. This reign, sometimes direct and sometimes indirect, has continued uninterruptedly since Liang Shih-yi and Yeh Kung-cho and their associates gained control of Chinese railways and government banks during the last days of the Manchu *regimé*.

Immediate visible evidence of the fall of the Chiaotung princes probably will be seen in two eventualities: firstly in a complete new policy of government railway administration; and secondly in the separation of the Bank of China or Bank of Communications from the government, or the amalgamation of the two banks—leaving but one national official banking institution. The minister of communications, Mr. Kao En-hung, has been set the difficult task of eliminating Chiaotung and other political influences from his ministry and placing government communications upon a purely business basis of administration. His first act has been the lopping off of some three million dollars silver per year from the payroll which involves the abolition of all superfluous positions, whether advisory or managerial. The directorates general of five railways have been abolished.

Mr. Kao is living up to the letter of contracts with foreign financiers providing for these positions, by conferring upon the managing directors the concurrent title of director general. Mr. Kao's policy towards the railways, while not expressedly that of unification, is one of economy through amalgamation of various departments concomitant to traffic such as the police and sanitary services.

In the ministry of finance a more complicated situation is faced. There the new minister, Tung Kang, must reckon with the open hostility of the Chinese Chiaotung bankers whom he has *injured and implicated in his recent graft investigations*, the apathy of the foreign loan market due to defaults on foreign obligations, the decrease in customs revenue caused by adverse exchange, and the crushing burden of usury which the government is obliged to pay to its miscellaneous creditors.

One of the first schemes which the new ministers who are carrying through General Wu Pei-fu's policies plan to execute, is a gigantic refunding loan for the purpose of regularizing all obligations and reducing the usury to a normal interest. It is hoped through this means to effect a saving of twenty million dollars per year in interest on four hundred million dollars of unfunded loans. The success of this scheme is, of course, dependent upon the status of Chinese credit, both domestic and foreign, but particularly foreign.

General Wang Shih-chen (the Dragon), new Premier of the Peking Government

Tung Kang, Peking's new Minister of Finance

The plan of the new Chinese cabinet is to fund four hundred million dollars silver worth of public loans, comprising practically all of the national indebtedness not under process of repayment from dependable revenues like the customs. The fund is proportioned about as follows: domestic issues, two hundred and forty million; American and European loans, eighty million; unsecured Japanese obligations, one hundred and eighty million.

These last, it will be readily recognized, are the Nishihara loans. The determination of the new *regimé*, which is generally regarded as anti-Japanese, to manfully meet these obligations which previous *regimés*, freely designated as pro-Japanese, have declined to so much as recognize, should create a sensation as well as cause a great revulsion of feeling throughout Japanese business circles. How hard Japanese bankers have been hit by their inability to collect principal and interest on this money lent by them under the influence of their government for purely political reasons and spent or frittered away by corrupt Chinese officials, is a story the half of which has never been told. Nothing which could be done would contribute so much toward rallying the good will of the substantial element in Japan to the new *regimé* in China as the execution of this policy, which is the outgrowth of General Wu Pei-fu's desire to place all relations with Japan upon a clear and definite basis.

There is another phase to the refunding scheme which greatly concerns the international prestige of China. As is generally known, the Washington conference provided for the assemblage in China in January of next year of an international commission for the discussion and determination of the conditions which are to apply to the two and one-half per cent. increase in the customs tariff. Although nothing has been put into black and white to this effect, it is understood by both Chinese and foreign interests involved that the increased revenue is to be pledged to the amortization of various defaulted and uncovered foreign obligations before any part of it passes into Chinese hands. This, of course, virtually means that the foreign powers are to pay China's debts for her. It is, however, greatly saving of Chinese prestige as well as much more agreeable all around to have the Chinese themselves propose such a solution. The obligations to be embodied in the four hundred million dollar refunding loan, with the exception of the Nishihara loans and the Marconi issue, are already covered by good security and provided with revenues for their liquidation, but any deficiency in securities or revenues, according to the plans of the framers of the scheme, is to be met by the expected increase in the customs tariffs.

Many details of the scheme remain to be considered, although some of the most obvious difficulties have already received full discussion. In harmony with the policy of the new finance minister the public will be kept in knowledge of all decisions. Mr. Tung Kang states that several months will be required to develop this scheme. "I am not in favor of loans," said Mr. Tung Kang, "and I believe that a great majority of them in the past have been made for the benefit of the borrowing officials rather than to meet the exigency of the country. However, what we now propose is not a loan to be spent upon unproductive expenses or even upon construction projects but rather a funding of the present obligations against the government, both foreign and domestic, which have been contracted in such an irresponsible manner as to gravely impair the standing of the nation. And we hope, as well, to effect a great saving in interest. The first problem is to eradicate corrupt influences in the ministry of finance and its many subsidiary bureaus, and fill the financial and tax collection posts in Peking and throughout the provinces with men of integrity. This is no quick and easy task. Having attained something toward its accomplishment we will then be in a position to go ahead with our scheme."

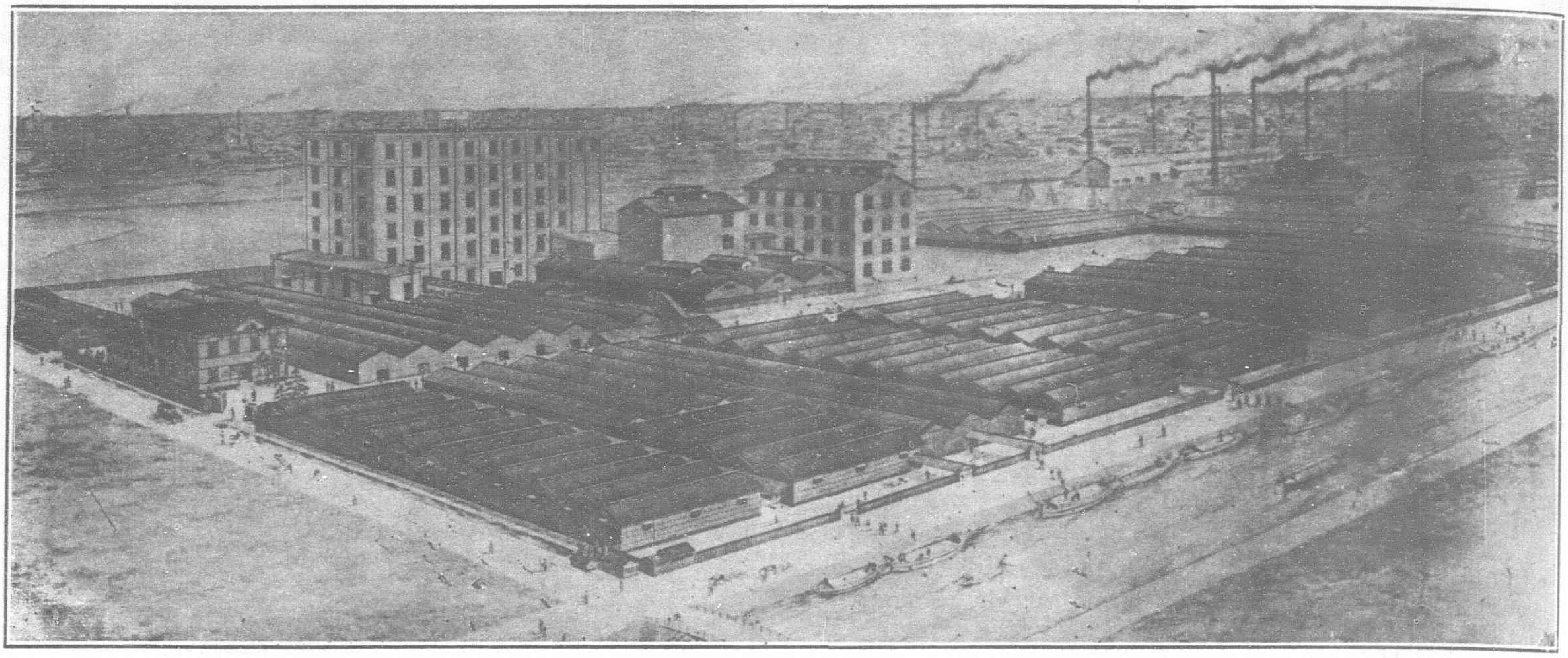
It is not planned to borrow to meet current administrative expenses. It is hoped by Messrs. Tung Kang and Kao En-hung that the savings effected by the abolition of superfluous posts and the introduction of measures of efficiency will enable the government to pay its way as it goes. As a means of working toward this end the ministries and departments of government and the railways are being put back, as far as is practicable, upon the budgets of the first year of the republic. An idea of the savings which it is hoped to effect through this change was given by Mr. Kao En-hung who spoke of two railways as examples. The operating expense budget for the first year of the Kin-Han Railway was thirty-four million dollars. This year it is forty-seven million, an increase of thirteen million, or more than forty per cent. The Peking-Mukden Railway's budget of operating expenses has increased within the same period of time by eighteen million dollars per annum. Mr. Kao hopes to effect a saving of at least thirty million dollars per annum on railway expenses. This, considering the pruning which he is making in budgets, seems to be a modest and safe estimate. At the same time he plans to save ten million dollars per year on the administrative expense of the ministry—a rather more difficult problem. If the railways can be brought back to the earning capacity of two years ago and the new audit system introduced by Mr. Kao proves an effective safeguard for the surplus profits, the government should be better off from this source by some twenty to forty million dollars yearly, which have heretofore gone into the pockets of the Chaotung clique.

The loan refunding scheme takes care of all government obligations, with the exception of payments due British, Japanese and American firms for materials supplied for the government railways. Those are said to total something like twenty-five million dollars. They are, however, secured upon the materials themselves and the railway revenues are pledged for their liquidation. The moment that efficient railway management and the return of peaceful conditions provide earnings surpassing operating expenses, these obligations will care of themselves.

The only remaining financial problem of any magnitude is that of the support of the troops. It would appear that henceforth the only military forces which are to receive recognition and support from the Peking government are to be the armies of General Wu Pei-fu. The cabinet in its last meeting pledged General Wu one million dollars per month for the upkeep of his forces in return for which Wu is to release his hold upon the Hupeh salt revenues and the revenues of the Peking-Hankow Railway, allowing these to revert as originally to the central government. The minister of finance has in turn requested General Wu to enforce payment of the proper provincial contributions to the central government's upkeep. The general has replied that he is prepared at any time to obey a reasonable mandate of the government in event of the recalcitrance of provincial officials.

General Wu Pei-fu

The Military leader of the Chihli or Peiyang Party, who faces the grand opportunity to unite China, and restore her prestige amongst the nations.



The Plant of the Toa Flour Milling Company at Tokyo

Japanese Flour Mills

By *H. C. Hugins*

THE Japanese flour milling industry made its first great step forward after the Russo-Japanese war. Its next period of development began with the outbreak of the great war. Before the Russo-Japanese war the whole production of all Japan's mills was only 750 barrels in a day of 24 hours. After the war this had increased to 8,710 barrels in 1911, and gradually continued to increase until just before the great war, in 1914, the productive capacity of all the flouring mills in Japan was 9,060 barrels. To-day, in 1922, this has risen to 21,000 barrels, a day of 24 working hours.

According to statistics published by the department of agriculture and commerce, in 1905, the total productive capacity of all the mills was 1,300 barrels, every 24 working hours. In the Kwanto district (Eastern Japan), there were then only nine companies operating 14 mills producing a total of 1,100 barrels a day. In the Kwansai district (Western Japan, with Osaka as a centre), there were seven companies operating seven mills producing only 200 barrels. The oldest of all these mills is the Ogibashi Flour Mill belonging to the Nihon Seifun Kabushiki Kaisha (Japan Flour Milling Co., Ltd.), opened in September, 1897, with a capacity of 200 barrels. Practically all the other companies operating before the Russo-Japanese war were established in 1901. Just after the outbreak of that war there were four companies in Ogata, Sapporo, Nagoya and Osaka, established in 1905, and together with the production of the old concerns the total production of the whole country then reached 5,200 bags a day, 130,000 bags a month of 25 days, and 1,560,000 bags a year.

All the factories mentioned were operated by power other than primitive water wheels, and their gradual development slowly effected a reduction in the output from the primitive mills scattered all over the country in every wheat producing centre. At that time these primitive mills were very active supplying war demand, and they produced from 8,000,000 to 9,000,000 bags a year.

Flour was first produced by the primitive water wheel mills, then large quantities were imported to fill up the nation's needs, particularly from the United States. In 1905, more than 4,990,000 bags were imported, and when modern mills were first built they produced not more than 10 per cent. of all the flour used in Japan.

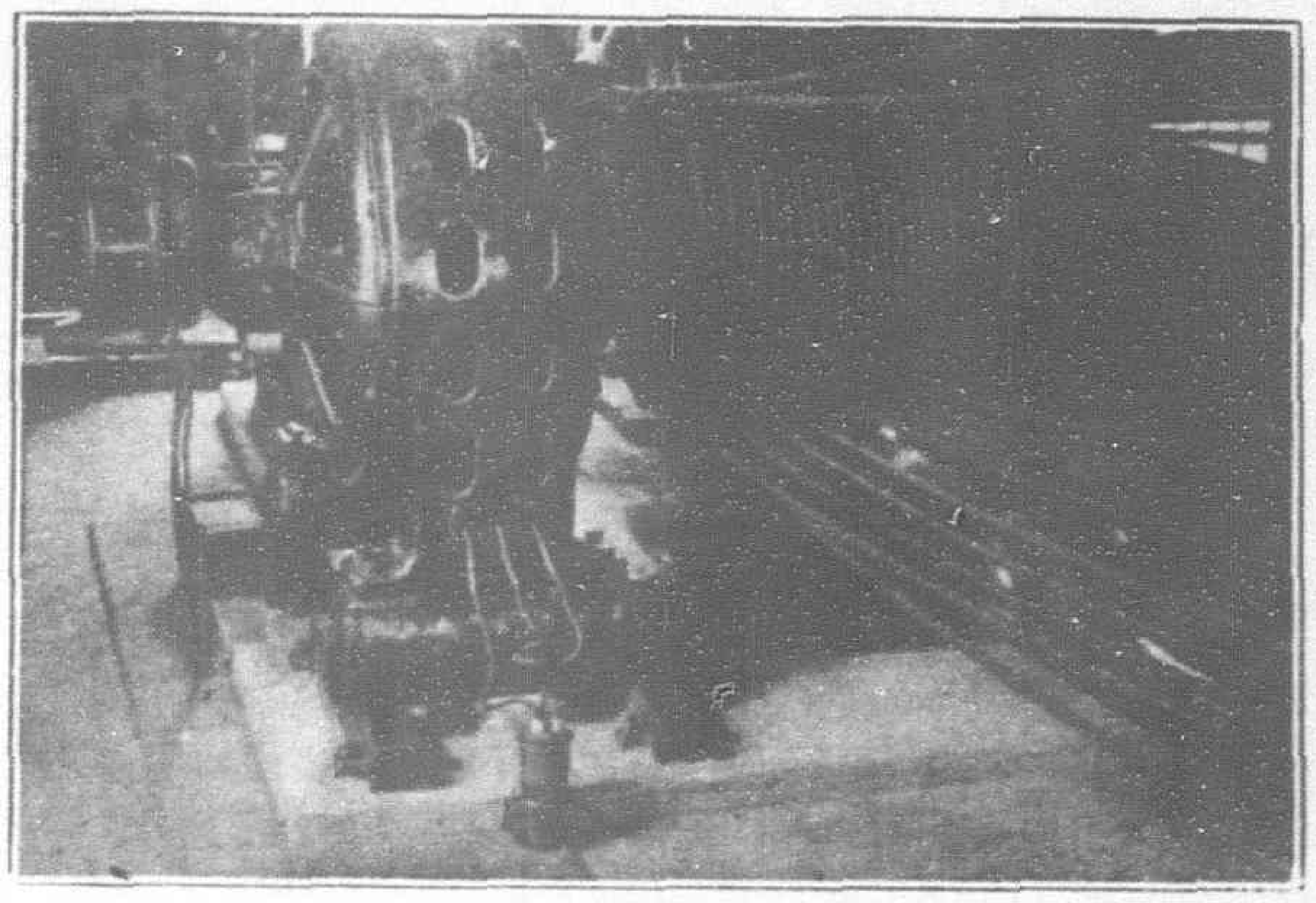
The number of mills and their capacity, in 1905, and in 1911, is compared in the following table :—

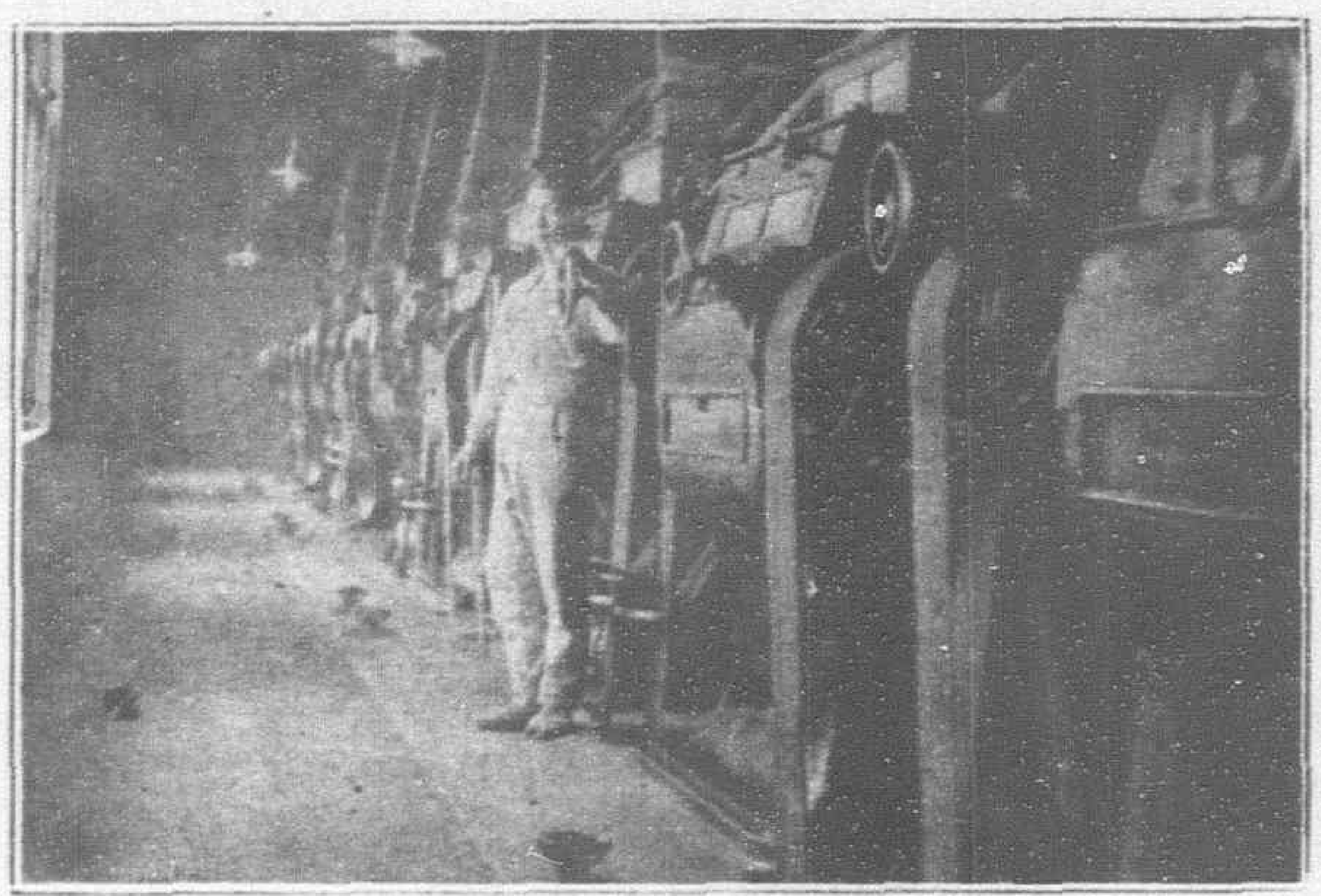
Name of Company owning Mill and Mill's Name.	1905 Capacity in 24 Working Hours	1911 Capacity in 24 Working Hours	Location of Mill.
Kwanto District :—			
Nihon Seifun K.K. :			
Principal Mill...	400 Bbls.	400 Bbls.	Tokyo
Onagigawa	— ,,	800 ,,	,,
Sunamura	— ,,	600 ,,	,,
Nisshin Seifun K.K. :			
Tatebayashi	100 ,,	1,000 ,,	Tochigi
Utsunomiya	100 ,,	400 ,,	,,
Yokohama	— ,,	400 ,,	Kanagawa
Toa Seifun K.K. :			
Principal Mill...	— ,,	700 ,,	Tokyo
Sapporo	200 ,,	200 ,,	Hokkaido
Shiraishi Kofun K.K.	65 ,,	65 ,,	Fukushima
Uzen Seifun K.K.	50 ,,	60 ,,	Yamagata
Matsumoto Seifun K.K.	65 ,,	65 ,,	Saitama
Matsudo Seifun K.K.	40 ,,	40 ,,	Chiba
Ogata Seifun K.K.	30 ,,	40 ,,	Kanagawa
Kanagawa Mogi Kojo	50 ,,	— ,,	,,
Total	1,100 Bbls.	4,760 Bbls.	
Kansai District :—			
Masuda Seifun K.K.	— Bbls.	1,000 Bbls.	Hyogo
Nihon Seifun, Hyogo Mill	— ,,	700 ,,	,,
Asahi Seifun K.K.	— ,,	200 ,,	,,
Nihon Seimai Seifun K.K.	— ,,	250 ,,	Kobe
Nagoya Seifun K.K.	100 ,,	100 ,,	Nagoya
Osaka Masuda Seifun K.K.	100 ,,	100 ,,	Osaka
Dairi Seifun	— ,,	1,600 ,,	Moji.
Total	200 Bbls.	3,950 Bbls.	
Grand Total	1,300 Bbls.	8,710 Bbls,	

The capacity of the power mills developed rapidly until 1911 when it reached 8,710 barrels. The Nihon Seifun K.K.'s mill at Onagigawa was opened in April, 1908, at Sunamura in October, 1907, and at Hyogo in July, 1907. The Yokohama mill of the Nisshin Seifun was opened in August, 1909, and the Toa Seifun's mill at Tokyo was in operation in January, 1908. The Masuda mills and the Nihon Seimai Seifun mill were opened shortly after the Russo-Japanese war began.

In 1911 production of flour had reached 34,840 bags a day of 24 working hours. Annual production was 10,452,000 bags. One of the results of this great increase in power mill production was to drive the small water-driven flour mills out of business, and in this same year their total production fell below 7,500,000 bags. Imports also declined to only 798,000 bags. Power mill production and the old water wheel mill production were about the same, but import fell to only one tenth of the power mill production, one twentieth of the total production of flour in all Japan. The reason for this great change in the position of imports between 1905, when about 4½ million bags were imported, and 1911 when only about 800,000 bags were purchased abroad, is to be found in the revision of the tariff charges on flour which, at first taxed only 70.3 sen per 100 *kin* (133-lb.), was after the revision taxed Y.1.50 per 100 *kin*, an advance of more than 100 per cent. Wheat was not so adversely affected. Taxed at first only 50.3 sen per 100 *kin*, after the tariff revision it still was very lightly taxed at 57 sen per 100 *kin*. Naturally this stimulated the production of flour at home, and raw material took the place of manufactured flour in the country's imports.

THE TOA FLOUR MILL


Power Room


Roller Mill Floor

Bolting Floor

Packing Room

From 1907-1908 on so many factories were built that production eventually passed the point where the Japanese nation could absorb it. Naturally prices fell, and the trade was badly hit. Matters dragged on in a very indeterminate state until 1911 when the Nihon Seifun K.K., Nisshin Seifun K.K. and the Toa Seifun K.K., entered into an agreement to limit production from December, 1911 to May, 1912, to one-half of their potential capacity, and to fix prices at which they would sell their competing brands.

Just after the Russo-Japanese war, because of the competition off the domestic brands, imported flour fell into a very bad way indeed. And from that time on until the outbreak of the European war, there was practically no increase in demand for Japanese flour, either at home or abroad.

In 1914, the productive capacity of the machine power mills in the Kwanto was 5,080 barrels a day, in the Kwansai it was 2,250 barrels a day, in Kyushu, 1,600 barrels a day and in Nagoya 130 barrels a day, a total daily productive capacity of 9,060 barrels every 24 hours. This was an increase of only 350 barrels a day since 1911.

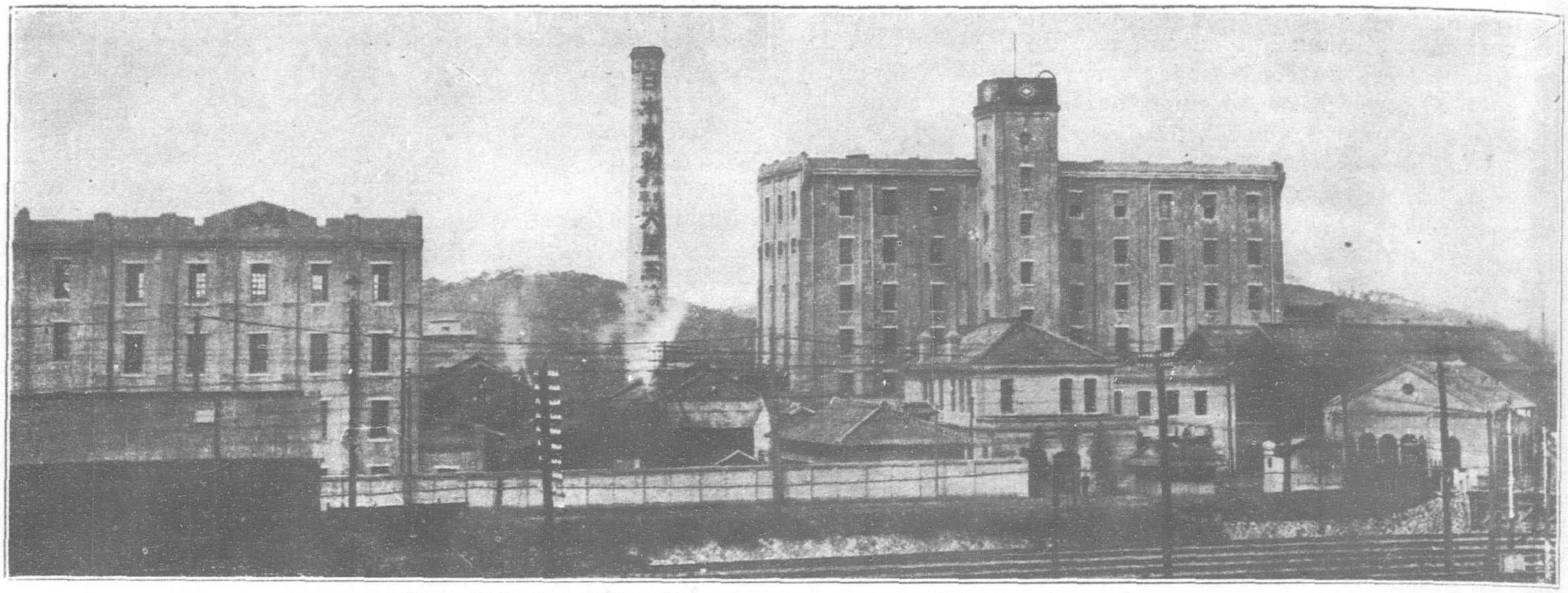
To-day, in 1922, many of the old companies have increased their equipment and raised their capacity. Many new companies, too, have added their production to the nation's flour supply. In the Kwanto 12,540 barrels, in Nagoya 1,830 barrels, in the Kwansai 4,800 barrels, in Kyushu, 2,450 barrels, a total of 21,620 barrels, can be milled every 24 hours. This is an increase of 220 per cent. compared with 1914. Production in one day is 97,290 bags, or 29,187,000 bags a year. If the actual potential capacity of each factory were only 80 per cent. of this quantity it would still be 23,350,000 bags a year. However, under any circumstances, at the present time, the production of the Japanese flour mills is in excess of the needs of the country. Productive capacity of Japanese flour mills, 1914 and 1922.

The domestic demand to-day requires only 13,500 barrels a day. Consequently there is always an excess of production. Since the great war export has almost ceased, and rate of domestic consumption despite great efforts made to persuade the Japanese people to eat bread in place of rice, is not increasing at any perceptible rate.

For a time raw material has been difficult to obtain, and most milling companies were having a hard time of it. Small companies were no longer able to carry on their operations, and at the end of 1921, actual production was less than 60 per cent. of the potential capacity of the mills, about 14,080,000 bags a year.

Productive Capacity of Japanese Flour Mills

Name of Company.	1914 barrels per day	1922 barrels per day	Location of Mill.
Kwanto District :—			
Nihon Seifun K.K. :			
Ogibashi Mill	400	—	Tokyo suburbs.
Onagigawa Mill	800	1,150	,, ,,
Sunamura Mill	600	800	,, ,,
Sendai Mill	—	100	Sendai
Sapporo Mill	200	300	Hokkaido
Takasaki Mill	—	600	Gunma prefecture
Koyama Mill	—	500	Tochigi prefecture



Dairi Mill of the Nihon Flour Company, Capacity, 1,500 barrels per day

Name of Company	1914 barrels per day	1922 barrels per day	Location of Mill.
Kwanto District :—			
Toa Seifun K.K. :			
No. 1 Mill	700	900	Tokyo suburbs
No. 2 Mill	—	2,100	,, ,,
Nisshin Seifun K.K. :			
Yokohama Mill	400	600	Kanagawa
Utsunomiya Mill	400	500	Tochigi prefecture
Tatebayashi Mill	1,000	1,200	Gunma ,,
Mito	—	700	Ibaraki ,,
Takasaki...	—	700	Gunma ,,
Matsumoto Seikoku Seifun K.K. :			
No. 1 mill	65	75	Saitama prefecture
No. 2 mill	200	200	,, ,,
No. 3 mill	—	500	,, ,,
Tsuchiura Seifun K.K.	30	50	Ibaraki ,,
Matsudo Seifun K.K.	65	65	Chiba
Shiraishi Kosan K.K.	65	65	Fukushima ,,
Uzen Seifun K.K.	60	60	Yamagata
Musashi Seifun K.K.	—	200	Kawagoe
Nitta Seifun K.K....	—	200	Gunma ,,
Saitama Kogyo K.K.			
Old Mill...	120	120	Saitama ,,
New Mill...	—	120	,, ,,
Chiyoda Seifun K.K.	—	300	Chiba
Sagami Seifun K.K.	—	100	Fujisawa
Nihon Kagaku Seifun K.K. ...	—	50	Chiba
Matsuda Seifun K.K.	—	30	Hamamatsu
Iwate Seifun K.K.	—	30	Senhoku district
Ryomo Seifun K.K.	—	200	Sano
Total 17 companies ...	5,080	12,540	
Aichi District (Nagoya as centre) :—			
Nisshin Seifun K.K. :			
Nagoya Mill	—	1,000	Nagoya
Shikishimaya Seifun K.K. ...	—	200	Handa
Mikawa Seifun K.K.	—	100	Okazaki
Nagoya Seifun K.K. :			
No. 1 Mill	100	200	Nagoya
No. 2 Mill	—	300	,,
Komiya Seifun K.K.	30	30	Miye prefecture
Total 5 companies... ...	130	1,830	
Kansai District :—			
Masuda Seifun K.K.	1,000	1,800	Hyogo
Nihon Seifun K.K., Hyogo Mill ...	700	1,200	Hyogo
Asahi Seifun K.K.	200	—	Kyoto
Nihon Seimai Seifun K.K. ...	250	300	Kobe
Masuda Seifun K.K.	1,000	1,000	Osaka
Nisshin Seifun K.K.			
Okayama Mill	—	1,000	Okayama
Uno Mill	—	200	Osaka
Shikoku Seifun K.K.	—	50	Tokushima
Awa Seifun K.K.	—	50	,,
Sakade Seifun K.K.	—	100	Kagawa prefecture
Total 9 companies... ...	2,250	4,800	
Kyushu District :—			
Nihon Seifun K.K.			
Dairi Mill	1,600	1,500	Dairi
Kurume Mill	—	750	Kurume
Kyushu Seifun K.K.	—	200	Fukuoka prefecture
Total 2 companies... ...	1,600	2,450	
Grand Total 30 companies	9,060	21,620	

Millers say that the strong point in favor of the profitableness of flour mills is that they cost but little to erect when compared with other manufacturing industries, and also, that they require only a small labor force. But if production must be limited the business can not be such a fine one as they like to declaim. New mills erected since 1918 have been erected at very high costs, and the results of their business operations have been very dissatisfying to the shareholders.

Just at present raw material is high, and the manufactured product is cheap, so that the future of the flour industry is very problematic.

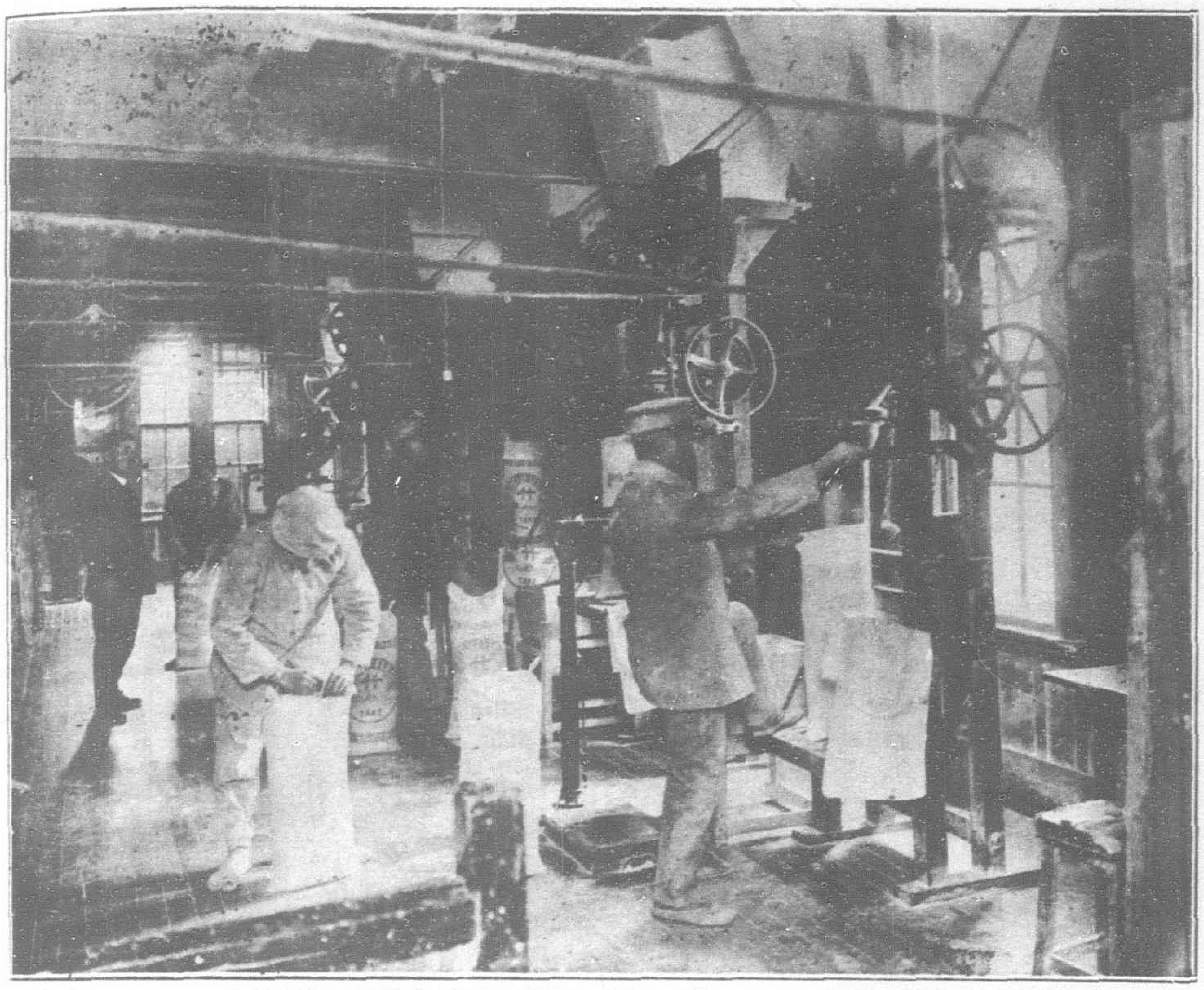
Flour Market To-day

Thanks to the period of seeming prosperity last year, from September, 1921, the flour industry took on a new lease of life. The price of flour bamboo brand, at one time reached Y.4.50 a bag. But during the first ten days of October, 1921, the price of flour in Japan took a heavy slump due to the decline in the price of wheat abroad, and also to the break in rice prices on the exchanges at home.

Since October, 1921, therefore, the price of flour has been continuously on the down grade, until it reached in January of this year the extremely low price of Y.3.70 a bag. But this low price helped the industry to recover because demand set in which raised prices by the middle of February to Y.4.25 a bag.

The recovery was largely due to the rise in the price of foreign-grown wheats. Australian wheat at one time quoted at Y.5.80 per 100 *kin* (133-lb.), C.I.F. Yokohama, recovered to Y.7.80. United States wheat rose from Y.6.00 to Y.8.00 per 100 *kin*, while Canadian rose in one bound from Y.6.20 to 8.90, C.I.F. Yokohama. The rise in price for practically all foreign wheat was approximately Y.2.00 per 100 *kin*. Japanese wheat, which had been very weak, at once took advantage of this situation in the foreign wheat market and rose in price, thus stimulating the market price of flour.

Then the very severe drop in rice the end of February depressed the flour market again, prices falling to Y.4.10 a bag. But foreign wheat more or less controls the actual price of flour in Japan, and foreign wheat continues to maintain high prices. And just at



Packing Room of the Datri Mill of the Nihon Flour Company, Allis-Chalmer's Machinery

present summer demand is ruling the market, and this makes the prevailing market tone extremely optimistic and strong.

The recovery in the price of flour again attracted public attention to the flour milling companies on the stock markets. All flour issues registered market rises. The Nihon Seifun K.K. shares had been pushed down below par during the time of low-priced flour, but they have recovered and now stand at something like T.56.00, which is Y.6.00 above face value. This is a recovery of Y.18.00 compared with the low point reached in 1921. The Toa Seifun K.K. and the Nihon Seifun K.K. shares also rose on 'change.

Market Quotations of Leading Flour Issues

Company name	Paid Up Value	Low, 1921	High, 1922.
Nihon Seifun K.K. ..	Y.50.00	Y.38,00	Y.56.00
Nisshin Seifun K.K. ..	50.00	78.00	103.00
Toa Seifun K.K. ..	25.00	32.00	39.00

Because of the financial depression and the low price of flour, at a time when the cost of wheat was above the level at which it could be milled at a profit in Japan, the flour mills had a bad time of it for a while. Japanese-grown wheat was also at such a price that it could not be milled at all. Consequently all the Japanese companies turned their attention to buying foreign wheat at as low a price as possible. This was about the only way they were able to make both ends meet with any profit, even though it was very small.

In 1921 the importations of foreign wheat amounted to 293,000 tons, or 1,758,000 *koku*. This is an increase of 400,000 *koku*, compared with 1920. Most of this wheat was grown in the United States and Australia.

This foreign wheat was not only used to mix with Japanese-grown wheat, but in many instances it was used to replace the Japanese wheat entirely. This tendency to replace Japanese wheat with foreign wheat became more and more marked until the orders for wheat placed this year already exceed the amount bought in 1921.

Excluding the amount already imported the quantity to be shipped from March, 1922, is estimated at something like 295,000 tons, or 1,770,000 *koku*, from the United States and Canada and Australia.

Wheat Ordered for Shipment, 1922

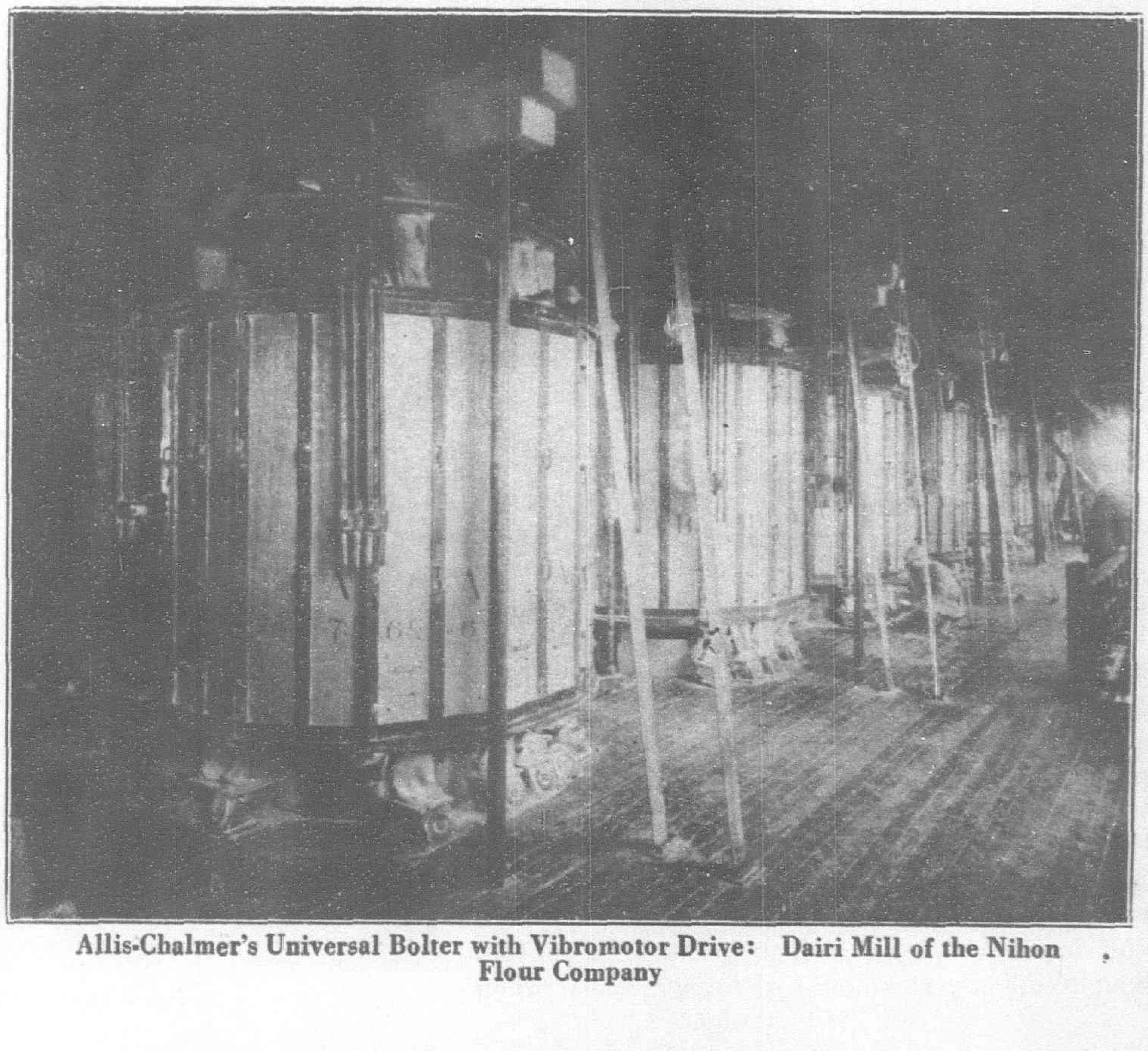
Country of Origin	Quantity	Value
Australia ..	180,000 tons	Y.18,000,000
United States	45,000 ,,	4,200,000
Canada ..	70,000 ,,	7,000,000
Total	295,000 tons	Y.29,200,000

Australian wheat gradually fell in price towards the end of 1921 because of the fears of Australian wheat growers about the future of prices after the decontrol of foodstuffs in October last year. Because of the low price of Australian wheat, Canadian and American wheat, assisted by the rise in the Anglo-American cross rate, fell also.

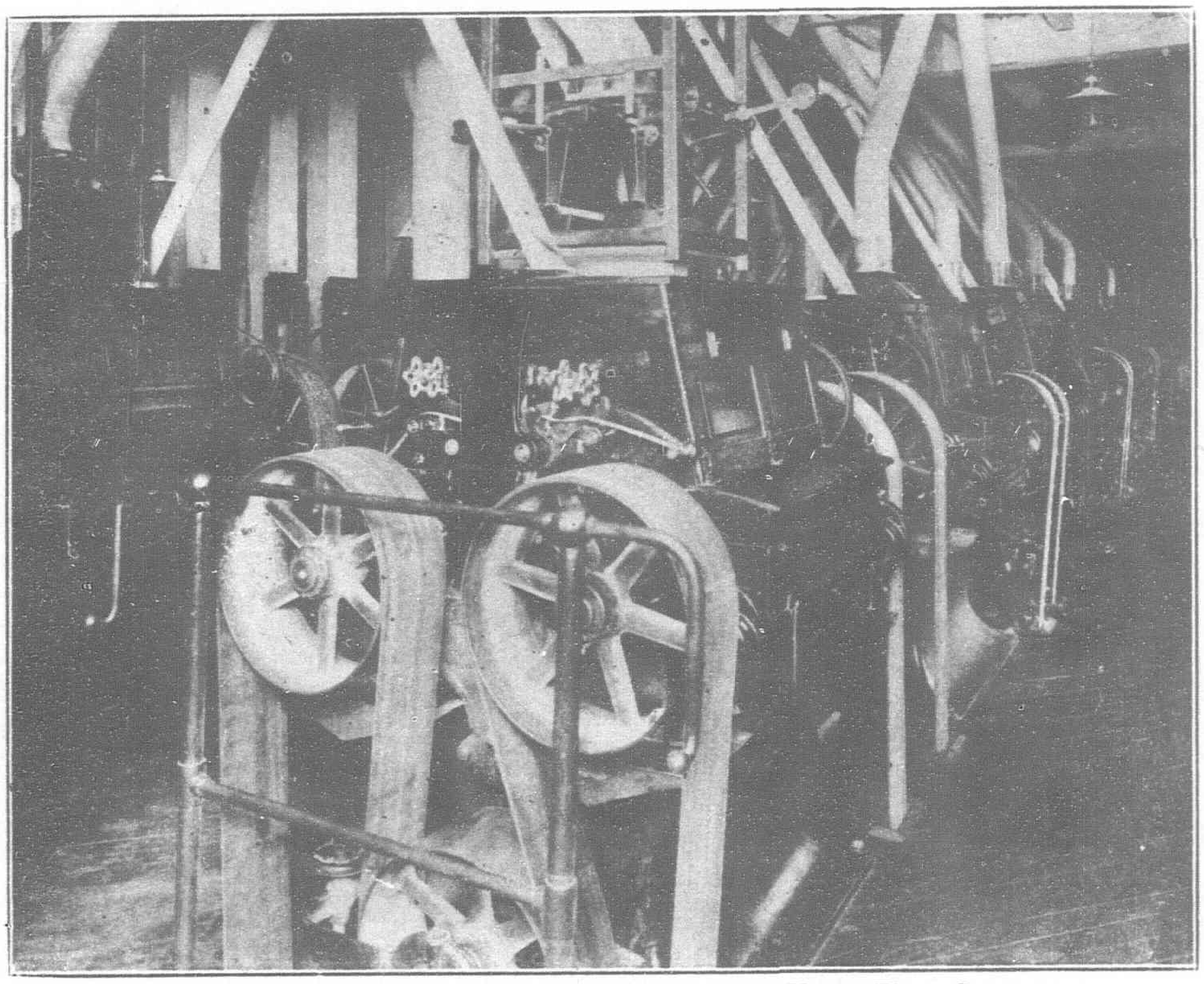
In November, 1921, American wheat was quoted at Y.6.00, while the C.I.F. price Yokohama was Y.6.20. The amount of Canadian wheat imported is the least, although Canadian wheat is the best quality the Japanese import. This was due to the fact that Canadian prices did not fall for some three months after Australian and American began to decline. The average purchase price of foreign wheat was Australian Y.5.50, and American and Canadian, Y.6.20 to Y.6.30, per 100 *kin*.

But the price of wheat suddenly recovered Y.2.00 per 100 *kin*, while the price of flour also rose by 50 sen a bag. Even with prices falling at the present time, they still remain about 30 sen higher than the lowest price reached last year. It is natural therefore that the future of the flour milling trade should not be considered so alarming.

The production of the mills was completely sold up to the end



Allis-Chalmer's Universal Bolter with Vibromotor Drive: Dairi Mill of the Nihon Flour Company

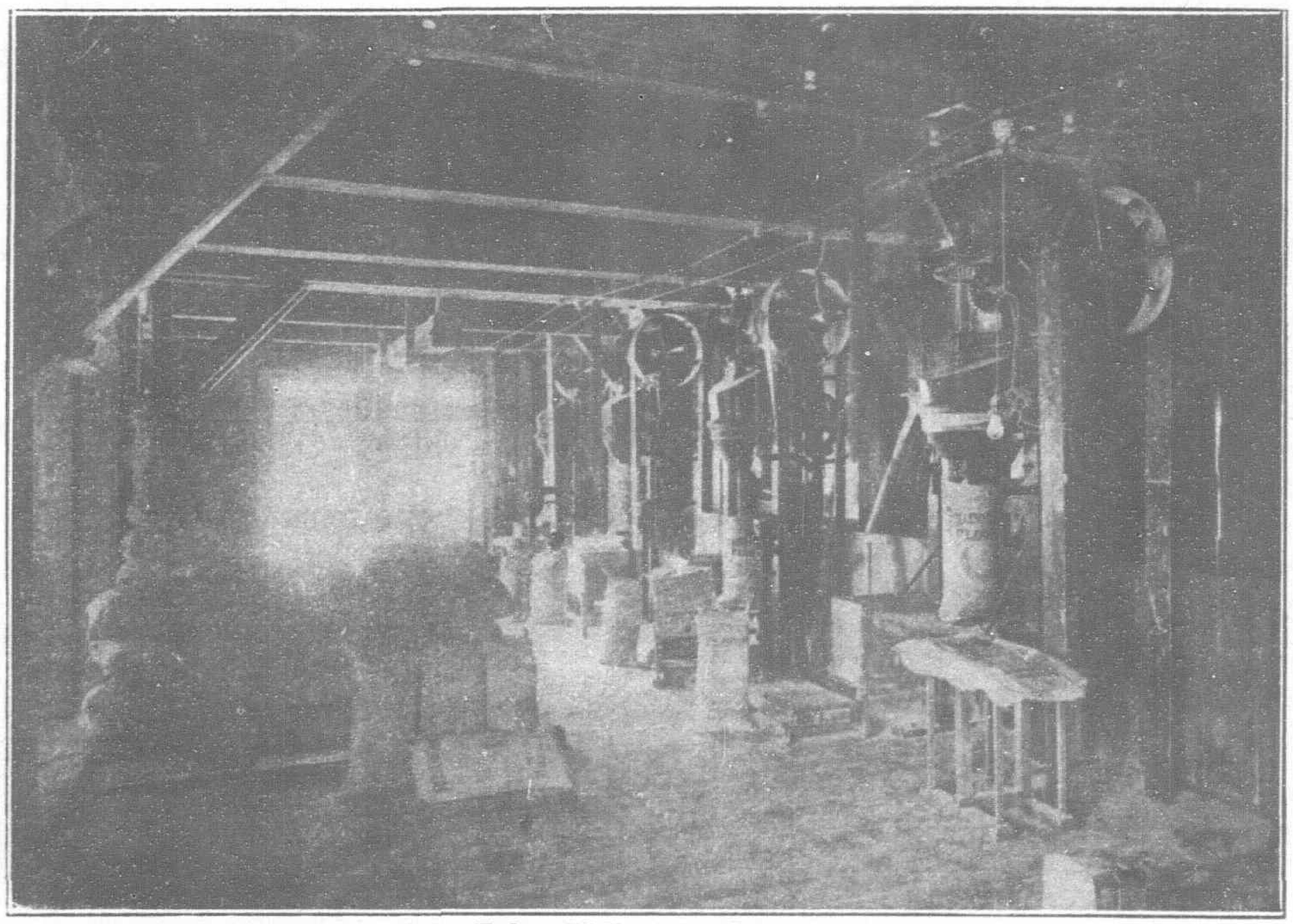


Allis-Chalmer's Roller Mills: Dairi Mill of the Nihon Flour Company

of March, 1922. The production will, therefore, not be thrown on the market for sale at any price. Consequently it does not seem that matters are in any very unfavorable state for the profits of the flour mills.

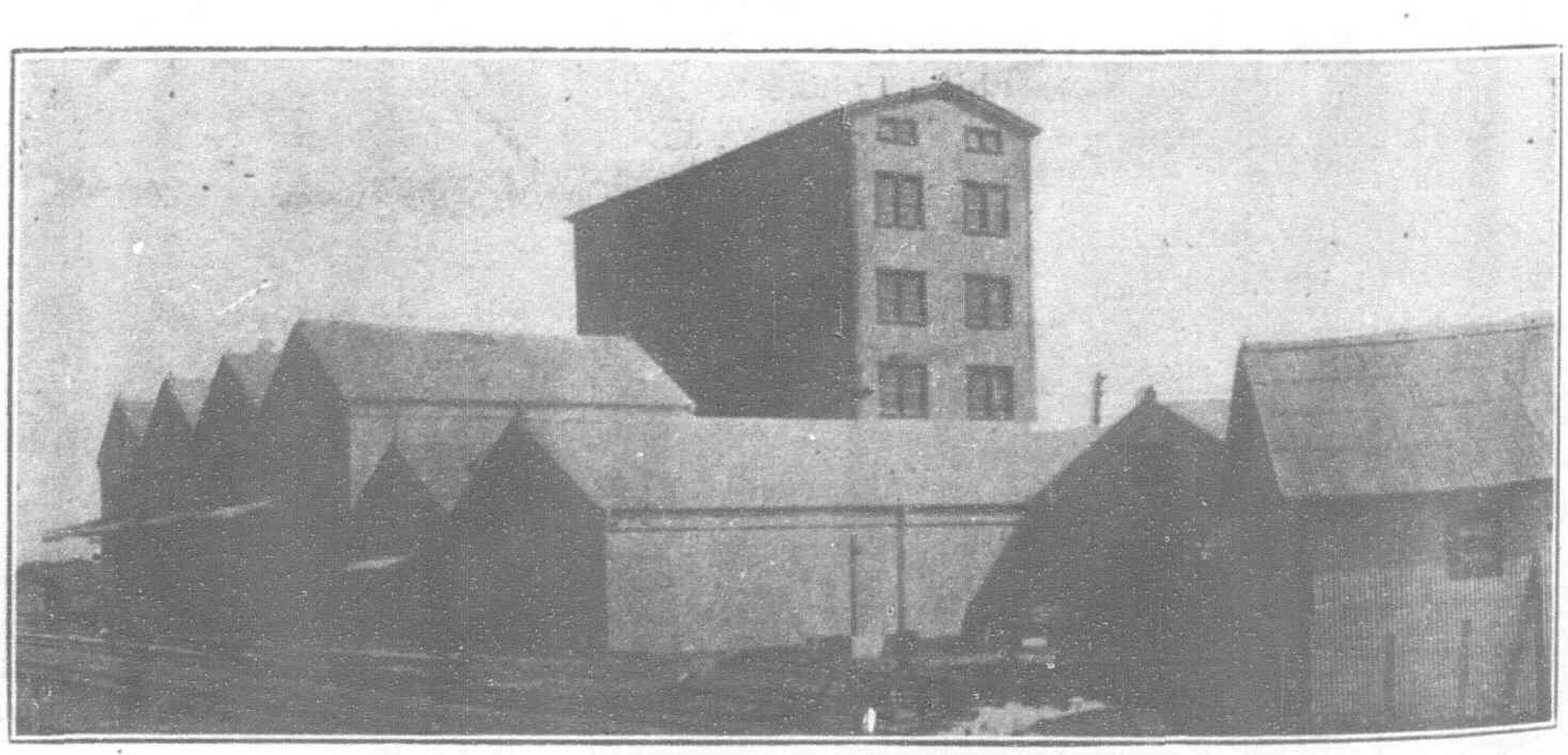
Cost of Production

Estimating the price of wheat C.I.F. Yokohama at Y.6.50 per 100 *kin*, when duty and certain minor costs are paid, it mounts to Y.7.50 per 100 *kin*. Estimating two bags of flour from 100 *kin* of wheat, the net cost of flour is Y.3.75 a bag.



Packing Room of the Tokyo Mill of the Nisshin Flour Company, Ltd.

The flour mills have been refusing sales at less than Y.3.80 a bag and with the exception of quantities dumped by the weaker concerns, there has been little flour for sale under the fixed price. Consequently the flour mills have been making a profit of 5 sen a bag. The recent improvement of prices has greatly increased this profit, and as millers who are not acting in the price agreement are also profiting by this advance. It may accordingly be believed that the business results of the flour mills this half year, December, 1921-May, 1922, will be quite satisfactory to the shareholders. Unfortunately there are some mills which bought foreign and domestic wheats at high prices. Those who bought the largest amount of foreign wheat when prices were at their lowest are making the biggest profits to-day.



No. 2 Tokyo Mill of the Nisshin Flour Company

It is impossible to learn just what amount of wheat has been purchased by each company. But from all information available it would appear that the Toa Seifun K.K. bought the greatest amount, at least compared with its productive capacity, of any company in Japan, while comparatively, the Nisshin Seifun K.K. bought the least. But when the total amount of wheat purchased is considered the Nihon Seifun K.K. bought the most, and the Toa Seifun K.K. the least of the three big flour companies. Whether these companies will show good results this term remains to be seen, but the general tendency is to be hopeful.

After the outbreak of the war the flour milling companies were uniquely prosperous, but from the end of the first term of business in 1920 (May), things have been going from bad to worse. The three big companies at once adopted a policy of watchful waiting. They made no capital changes, and called up no new payments on issues outstanding. The Toa was the only company to increase its capacity, by 1,000 barrels, while the Nihon became somewhat more strong by some amalgamations of minor concerns. All the companies reduced production to the minimum of demand, and naturally their income shows great decreases.

The Three Big Companies

From the points of capital and productive capacity the greatest flour milling company in Japan is the Nihon Seifun K.K. Its capital authorized May 31, 1921, was Y.11,550,000, of which Y.5,625,000 was paid up. On the same date it had loans unpaid amounting to Y.4,000,000, and reserves of Y.2,710,000.

In the first half of 1920, ending May 31, 1920, it earned Y.2,056,000 about 50 per cent. of its paid-up capital. One year later during the first half of 1921, its profit was only Y.42,000, about two-tenths of one per cent. of its paid-up capital. This has been an ordinary matter for most companies which were paying 20 per cent. dividends the beginning of 1920 were passing them by the beginning of 1921.

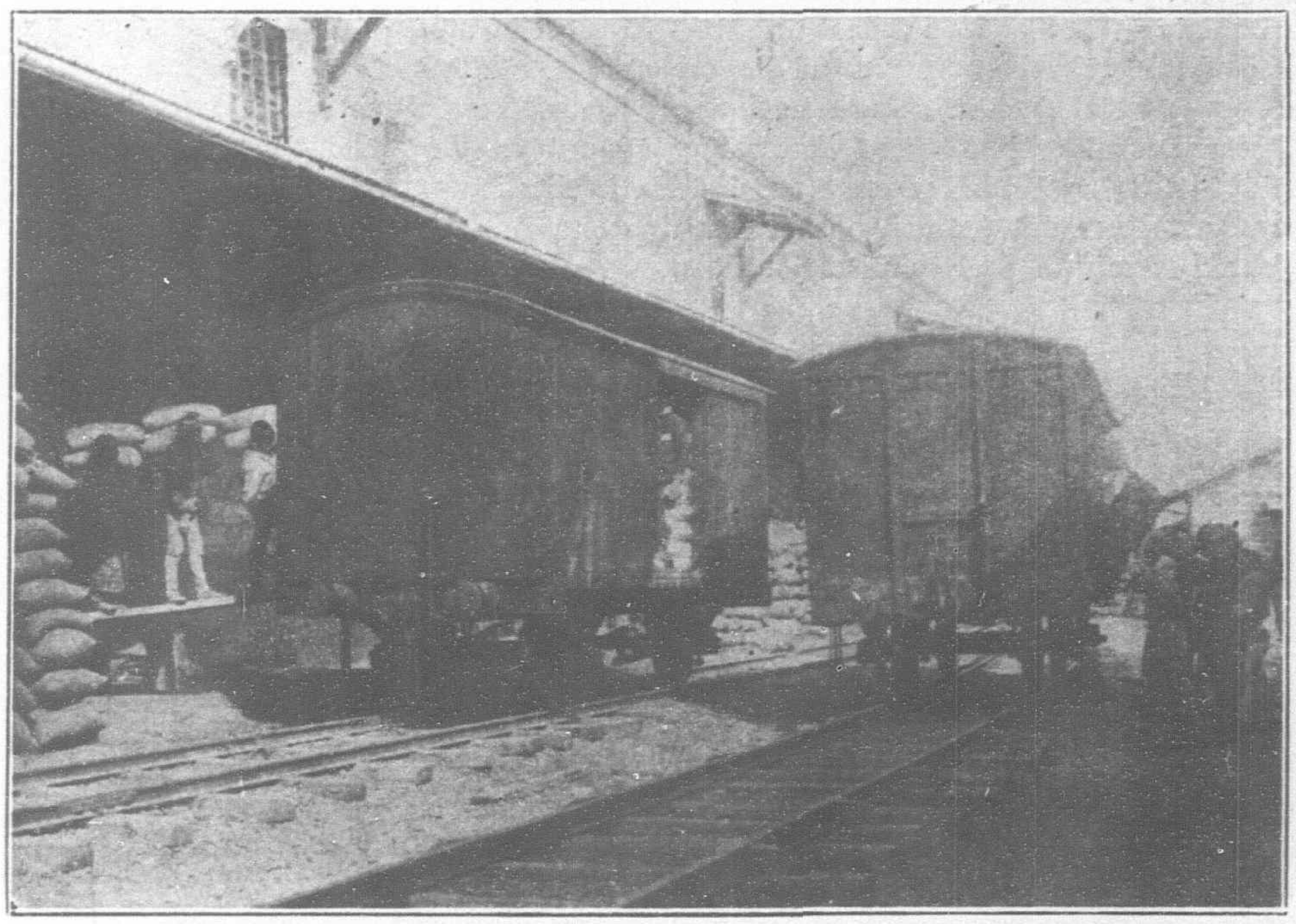
The Nisshin Seifun K.K., on May 31, 1922, had an authorized capital of Y.4,500,000, of which Y.3,100,000 was paid up. It reported no loans unpaid, and had reserves of Y.1,578,500. This company shows little change between 1920 and 1921. On May 31, 1920, its profits were Y.1,174,000, a year later they were only Y.510,000. But this decrease is very slight compared to the results of the Nihon Seifun's business.

The Toa Seifun K.K. showed a great decrease in profits between the first term of 1920 and the first term of 1921. Its authorized capital, May 31, 1922, was Y.2,500,000, of which Y.1,250,000 was paid up. It reported no loans unpaid, and owned reserves amounting to Y.238,523. But profits fell from Y.356,000, in 1920 to Y.122,000 in 1921.

The total profits of these three companies at the end of the first term in 1920 was Y.3,586,000, which declined by the end of May 31, 1921, to only Y.674,000, or approximately one-fifth. The profit rate, figured on paid-up capital, decreased from 74.5 per cent. to 14 1/7 per cent.

At the same time the rate of dividend paid by the three companies decreased from an average of 24 per cent. to 9.3 per cent.

But the business results of all three companies showed improvements during the second half of 1921. Nihon Seifun profits reached Y.412,000, Nisshin profits were Y.613,000 and Toa profits, Y.182,000. This almost doubles the rate of profit and dividends increased to an average of 15 per cent. in the second half of 1921.


Private Railway Siding to the Tokyo Mill of the Nisshin Flour Co., Ltd.

The Nisshin Seifun K.K. always retains 20 per cent. of profits as reserve. Consequently the percentage of its reserves, to its paid-up capital, is always much greater than that of the other companies.

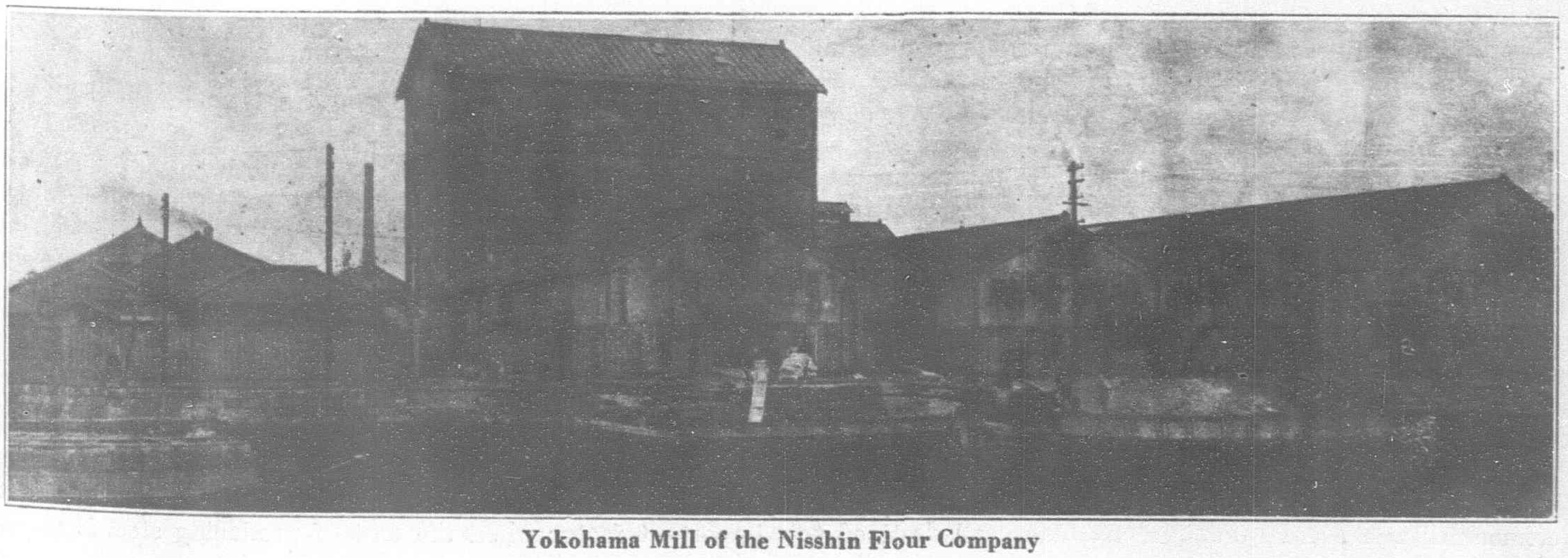
The fixed capital investments of these three companies per barrel of productive capacilty are as follows:

	Fixed Capital	Productive Capacity	Fixed Capital per barrel
Nihon Seifun K.K. ..	Y.14,658,000	25,166 Bbls.	Y.5,824
Nisshin Seifun K.K. ..	7,639,000	14,961 ,,	5,039
Toa Seifun K.K.	3,131,540	10,505 ,,	2,981

To-day the principal factor affecting the profits of flour milling companies is their purchase of cheap raw material, and in their method of marketing their products. The Nisshin bought raw material in a cleaver manner thus increasing its profits. But the Nihon Seifun failed to purchase cheap Australian wheat, and consequently received a blow from which it has not yet recovered. This company resorted to the over-estimation of its real estate by Y.2,400,000 in its last term 1920, thus showing a fictitious profit. It has not yet recovered from this blow to its prestige in the financial market.

The profit-making ability of these three companies is as follows:

Company	Capacity barrels	Profit	Profit per barrel of Capacity
Nihon Seifun K.K. ..	6,900	Y.412,000	Y.5.97
Nisshin Seifun K.K. ..	5,700	613,000	10.75
Toa Seifun K.K.	3,000	182,000	60.65


Yokohama Mill of the Nisshin Flour Company

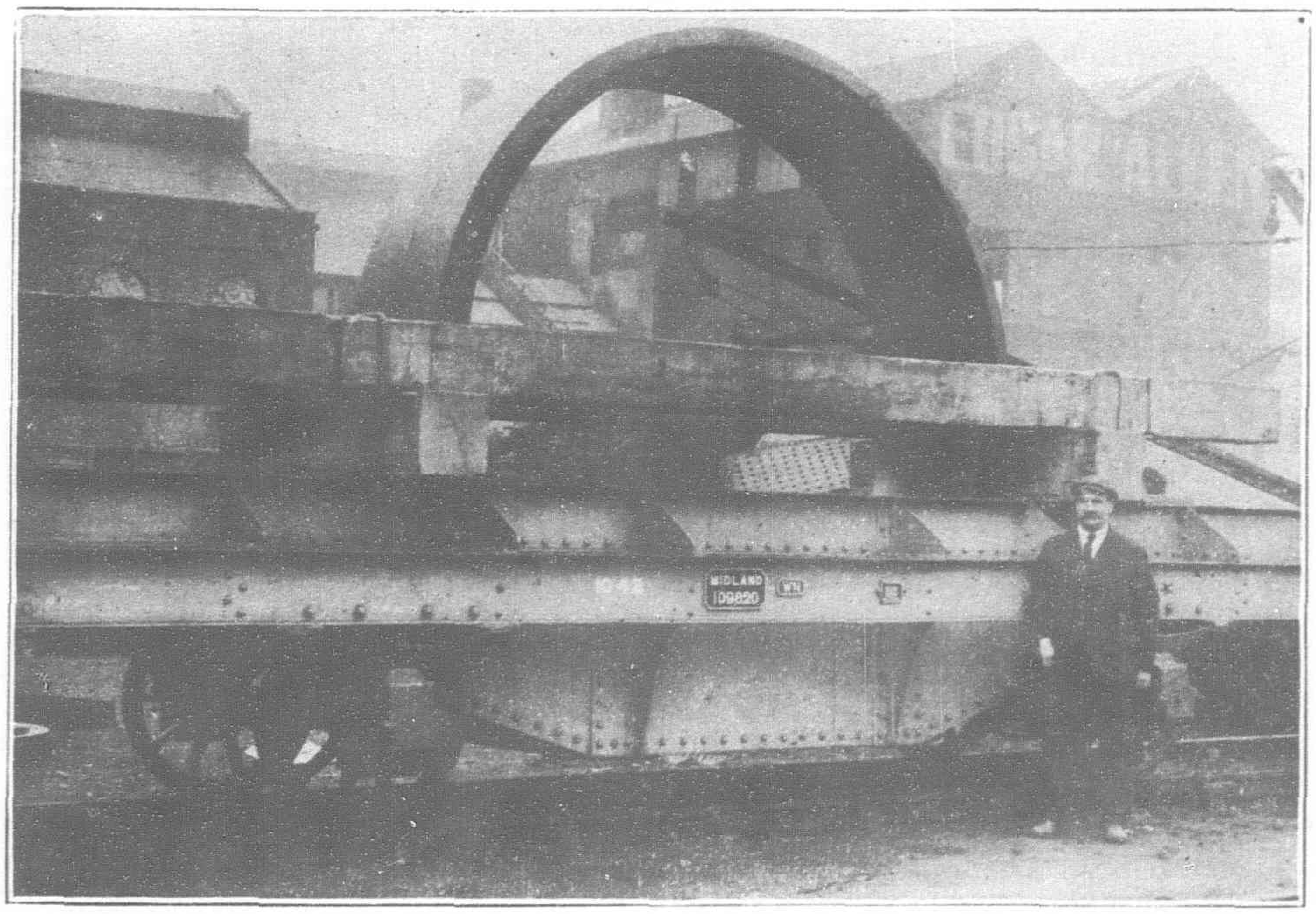
Steel Direct from Ore

Blast Furnace Eliminated from Steel Making

A Tribute to British Commercial Honor

THE production of steel direct from the ore has been the dream of metallurgists for years, and though many experiments, in a small way, have from time to time been made by eminent scientists, the problem, if not actually solved, has been at least allowed to remain in abeyance for all practical purposes, chiefly because it was found that any of the new processes were so costly as to make the production of steel by them an uneconomic proposition.

A few years back, however, it was mooted in metallurgical circles, that a French metallurgist, M. Basset, had at last discovered a method by which steel could be produced direct from the ore at a cost which would ensure commercial success. The Frenchman kept his secret well, and, though, at the time, there were many sceptical remarks on his claim to have succeeded where others had failed, none was quite sure of the lines upon which he had been working. Nothing had appeared in any of the technical journals, and, the debates at scientific societies either in Sheffield or in France were strangely silent on a matter, which, if all that is claimed for it is correct, promises to revolutionize the whole of the iron and steel industry of the world.



One of the Special Trucks designed to transport the special machinery made at the Edgar Allen Works, for a new process steel plant in France

The Dream of Years

A visitor to the railway sidings at the works of Messrs. Edgar Allen & Co., of Sheffield, last February would have found ample food for assuming that, whatever the sceptics may have had to say, the great French metallurgist is at least satisfied that he has brought the dreams of his fellow-scientists within the bounds of practicability. For there, on no less than twenty-nine trucks (fifteen of which were of a specially large size to receive their load) was securely packed, the first unit of a plant, which is going to attract the attention of the steel and metallurgical world.

It was a wonderful sight. Two of the most powerful engines of the Midland Railway Company stood hissing steam from their safety valves; behind them, on the quarter of a mile of trucks, lay a collection of the most unique and conglomerate mass of iron and steel that has ever been seen on the rails either in this or any other country. In Sheffield, there were a dozen or so cylindrical tubes, some measuring ten feet in diameter, and others measuring eleven feet eight inches, nestling snugly in their wooden beds and lashed down securely with great chains. They reminded one of the sections of a large funnel of an Atlantic liner. There, standing in a slanting position on ends, were large cast-steel riding rings, measuring 13-ft. 6-in. in diameter, and weighing 8 tons each. To have laid them on the flat meant exceeding the gauge limit and to have put them in an upright position would mean the sweeping away of bridges and tunnels perhaps. Behind them lay an assortment of weird and wonderful machinery all destined to play its part in the great invention.

Big Transport Problem

As the hooters of the surrounding works sounded the hour of one o'clock, the mighty mass of metal moved slowly off to the accompaniment of much puffing and snorting of steam by the locomotives which were severely tested in their efforts to get their cargo under way. It was estimated that in all there were some 1,000 tons of machinery on the move, 200 of which, represented the weight of the plant being shipped to Domicile, France. The operation was watched with the greatest anxiety by the directors, staff and workmen of the firm, who were naturally desirous that their latest product should not suffer any mishap at the outset of its journey. The difficult task of conveying the goods to their French destination was entrusted to the expert hands of Messrs. Henry Johnson Sons & Co., Norfolk Row, Sheffield.

For the transport of the machinery to Hull, the Midland Railway Company had to make special arrangements to ensure safety. From that port it was shipped by special steamer to Rouen, from whence it was taken by rail to Domicile. So fraught with danger is the transporting of the huge mass, that Messrs. Johnson's French representatives had to make special arrangements with the French railway authorities for its handling.

As stated, little is known of the actual details of M. Basset's process. So desirous was the inventor that as little as possible should be known of his work, and so great was his faith in Messrs. Edgar Allen & Co., that he stipulated there should be no sub-contracting. Therefore, the whole of the plant has been constructed at the famous Tinsley Works, and the section despatched last February only represents one-third of the whole order.

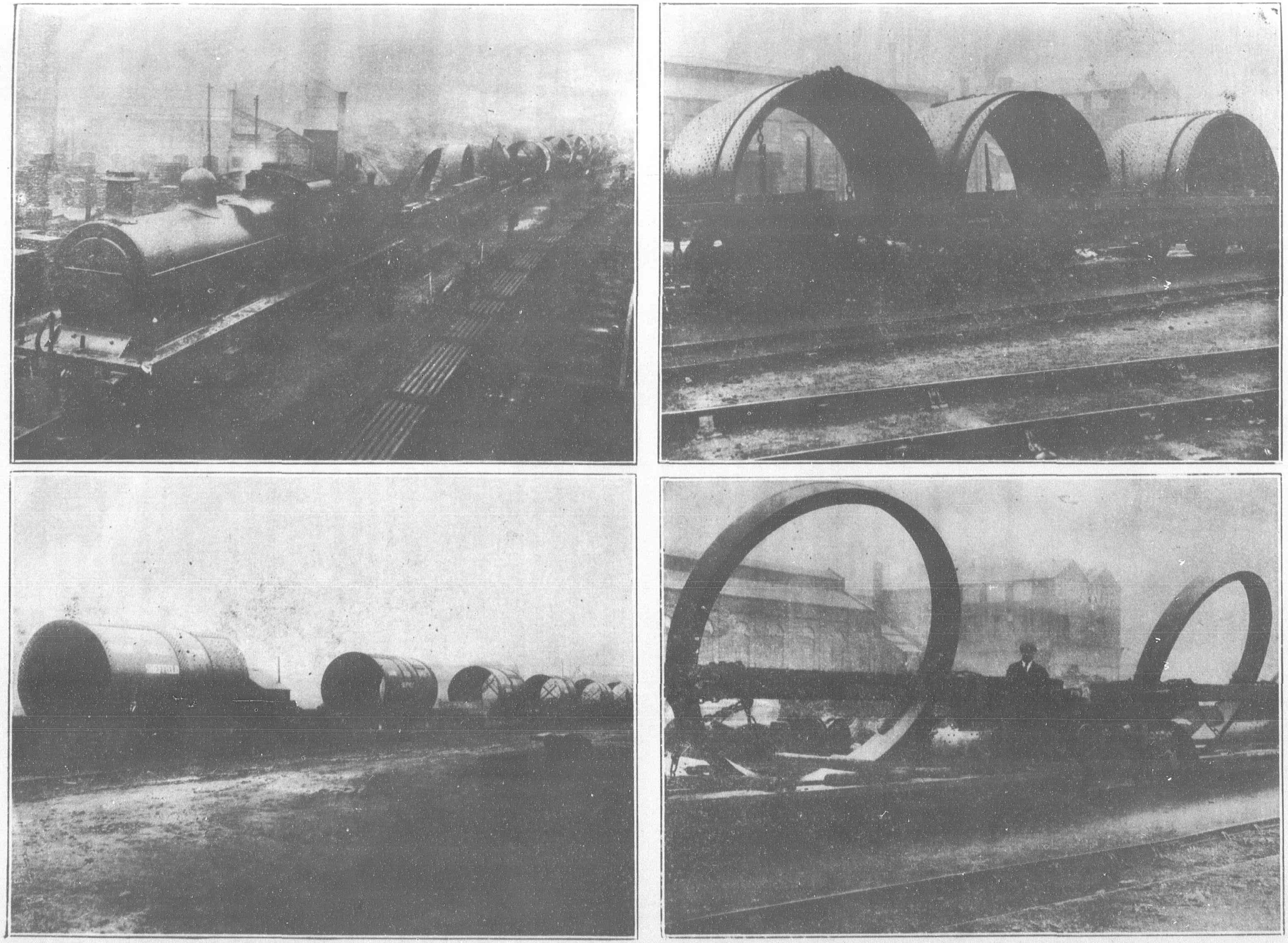
Tribute to Sheffield

It is a tribute to the firm to say that their craftsmanship, and the discreet manner in which the inventor's wishes regarding secrecy were observed, have earned the whole-hearted approbation of M. Basset. Sheffield, the home of the steel trade of the world, was entrusted with the manufacturing of a plant which bids fair to revolutionize its staple industry, but Sheffield, outside Messrs. Edgar Allen's works, knew nothing of it! Such commercial integrity will redound to the everlasting credit of the firm and add yet another link to the city's reputation as a place where business men, either at home or abroad, can have a fair and square deal.

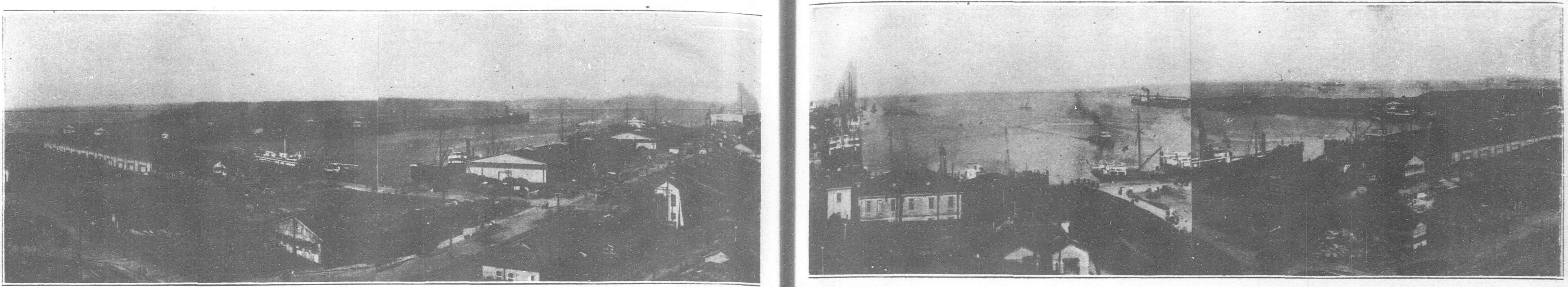
The basic principle of the Basset process is somewhat akin to the rotary kiln of a cement works. The use of the last furnace is entirely eliminated, and this, of course, is the important factor when the cost of producing steel is taken into consideration. Into revolving cylinders, some 200-ft. long, the ore will be projected at one end, and, as it works its way towards the other it will be fired with pulverised coal, much in the same way as a rotary cement kiln. The cylinders will, of course, be lined with firebrick, and when revolving will weigh about 400 tons each. Such in brief is the method, the success or otherwise of which is keenly awaited by the whole metallurgical world.

THE PLANT EXPECTED TO REVOLUTIONIZE STEEL MAKING

The first shipment of twenty-nine trucks of special machinery made at the works of Edgar Allen & Co., of Sheffield, for erection in France, where the manufacture of steel will be attempted without the use of blast furnace



DAIREN HARBOR



PANORAMA OF DAIREN HARBOR

THE rise of Dairen to the second port of China is one of the marvels of Far Eastern development, an indication of what can be done in other parts of China under an efficient and honest government. Twenty years ago it was a mud hovel fishing village, to-day, the gateway to one of the richest empires of the world, the land of to-morrow. The grand plans of Russia for the development of this port have been carried out and magnified many times by the South Manchuria Railway Company, whose development of the soya bean and the coal of Fushun provides freight for the railway and cargoes for the fleets of steamers that now enter and clear from the port. Dairen is the outlet and inlet, the commercial metropolis of the vast region that in the next quarter century will loom large in the pages of history.

The port works are being constantly improved to handle the increasing volume of trade. New concrete warehouses with special cargo-working appliances are taking the place of the old open-storage system, a beautiful modern fireproof office building houses all the different harbor offices, and special equipment of all kinds has been installed to take care of the many different requirements of loading and unloading vessels. The port of Dairen is up-to-date, the best equipped in China. Some idea of the advances that have been made in the port under Japanese direction may be gleaned from the following official figures :—

Port of Dairen.—The port of Dairen is the starting point of the South Manchuria Railway and a gateway to Manchuria and Mongolia, the staple products of which find the only outlet open all the year round. It is also the only free port in the Far East.

Dalny under Russia.—Russia, eager to secure an ice-free port in the Far East, leased for the term of 99 years the so-called Kwantung leased territory, in the southern extremity of Liaotung peninsula, by virtue of the Russo-Chinese treaty in 1898.

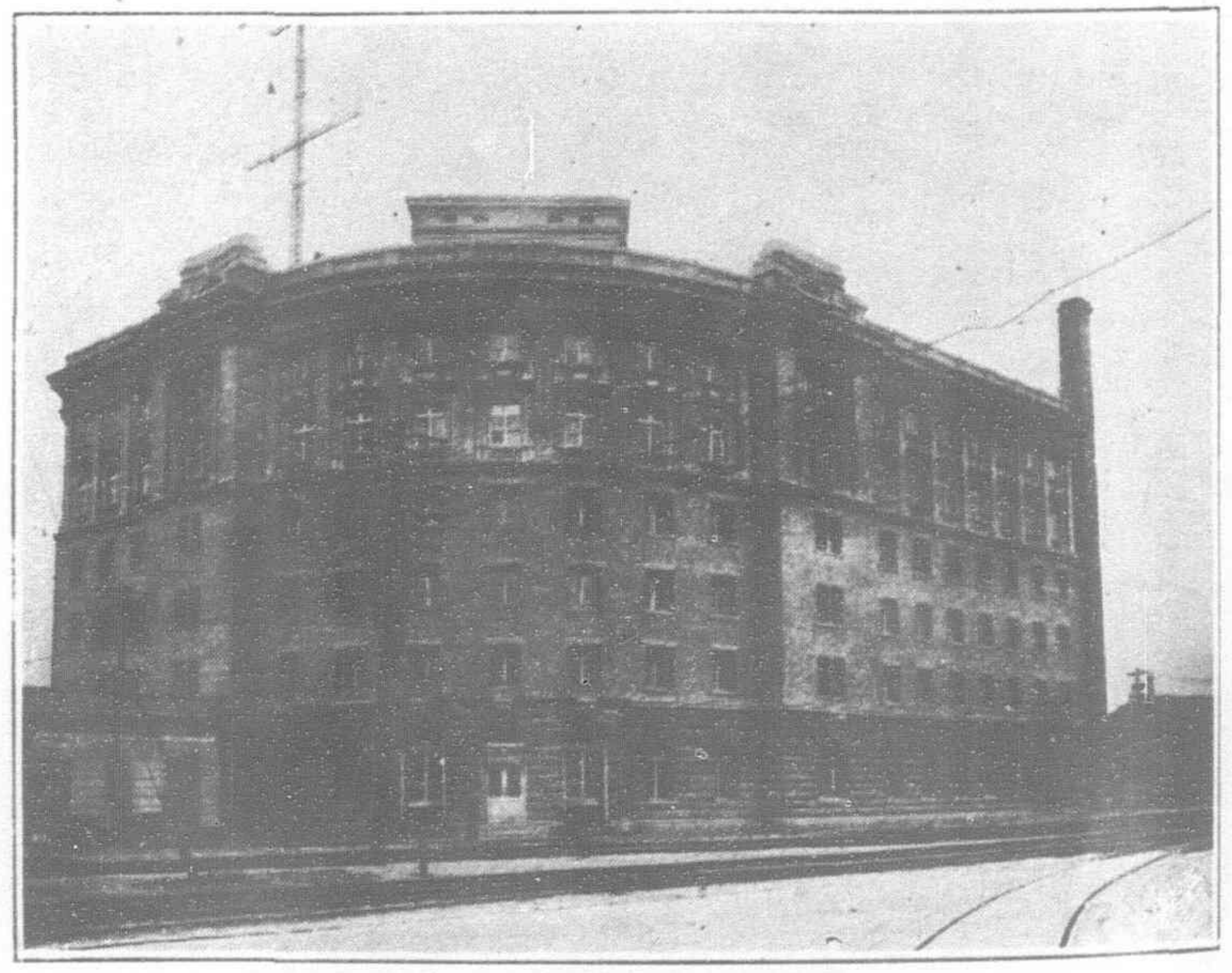
Russia started immediately afterwards to construct a commercial port on an extensive scale, which was then styled Dalny meaning "Far Away" in Russian, and which has been destined to grow up into the present port of Dairen.

Under Japanese Management.—In September, 1905, in terms of the Portsmouth treaty, Japan took over the leasehold above mentioned and established the South Manchuria Railway Company with the object of improving the economical situation of Manchuria work of reconstruction, extension and fresh construction has been energetically carried on at an enormous outlay and the port of Dairen has become what it is to-day.

Dairen can now accommodate vessels to the extent of 150,000 tons at a time. The aggregate annual exports and imports reached 4,500,000 tons.

Free Trade Zone.—By the provisions of the Russo-Chinese treaty, the Kwantung leased territory remains a free trade zone.

Cargo-work.—Cargo-work at Dairen is in principle conducted along the quay wall. When no berth is left available, cargo-work may be done by lighters. As more or less difficulty attends on the berthing and unberthing of vessels, the compulsory pilotage system is instituted and operated over vessels of over 1,000 tons gross. The pilotage need not, however, be borne by the vessel. Nor is any wharfage charged. Only, as fee for the use of steam launches, etc., at the time of berthing and unberthing, a tariff of charges for the same is charged. In this respect, Dairen finds not alike among the ports in the Far East. It may be considered as a substantial favor to the vessels calling at Dairen.



New Wharf Office at Dairen

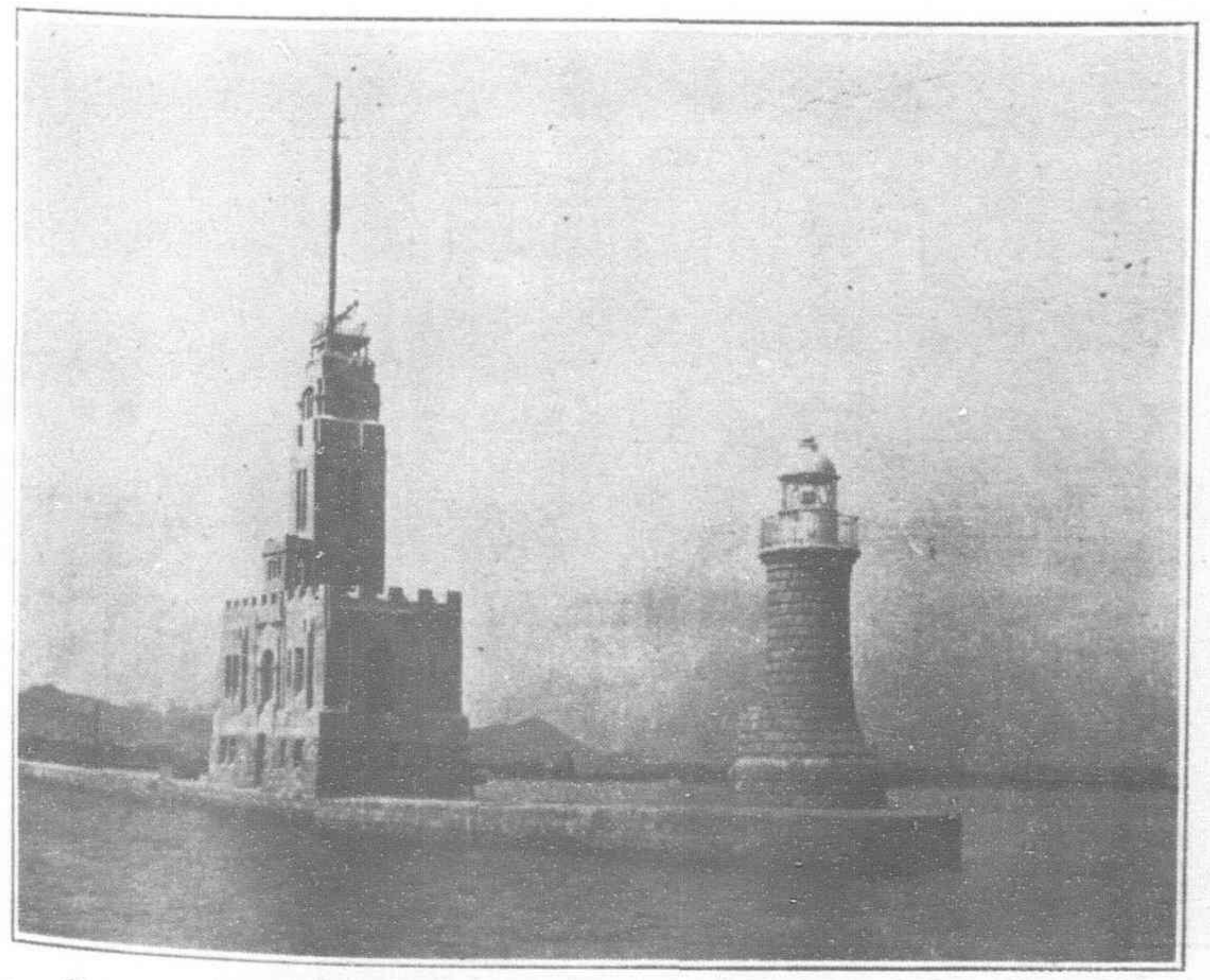
Cargo-working Equipments.—No special equipments worth mentioning exist at present in the line of cargo-working facility. Coolie labor is depended upon almost wholly. In efficiency, however, coolie labor quite holds its own against mechanical working. Besides, because of its cheapness, the low rates obtaining at Dairen in cargo-work and other charges have no parallels elsewhere in the world.

Chinese Coolies.—Chinese coolies are generally of mild disposition and well suited to employment in a gang. Shantung is the principal source of supply of coolie labor.

The exports of Dairen consisting mainly of agricultural products there are distinctly busy and dull seasons. The busiest season begins about the middle of November each year and lasts till about the middle of the following March. In summer, things usually move slowly, and it is often called the dull summer spell.

A tendency has appeared lately to bring both extremities nearer together.

Climate.—The climate may well be called a continental one. It is intensely cold during the busy season, and more or less difficulty is met in cargo-work at times. But never has the surface of water in the harbor got frozen so badly as to make it impossible for a vessel to come to, or leave the wharves. So far the thickest ice formed in the harbor was about 10 inches. However, as the service of ice-cutters is always available, no hindrance has been felt to the access of shipping. It may be added that the larger-typed launches belonging to the wharf office are all equipped with ice-breaking appliances.



Entrance to Dairen Harbor: Light House at end of Breakwater

Wind.—There is a strong north wind prevailing in winter, but no serious difficulty is experienced. In other seasons, there is no local wind.

Current.—No current runs in the harbor of Dairen, and this facilitates ship's access.

Fog.—It is foggy about the months of May, June and July, and the fog is often a menace to the shipping. There is, however, a foghorn installed on South Sanshantao Island at the entrance to the Dairen harbor. The foghorn is audible at the distance of 10 miles outward. Besides, a light-house showing a white revolving light stands on the same island. The light is visible 21 nautical miles off in clear day.

Wireless Station.—The Dairen bay wireless station is situated at Shatozu Takushan, about 11 miles eastward.

Wireless messages are accepted at the Dairen post office.

Harbor Administration and Management.—The harbor administration is attended to by the marine bureau of the Kwantung government. The maintenance, reconstruction and repair, extension, etc., of the harbor and its accessories are all looked after by the South Manchuria Railway Company. The management of the Dairen wharves belongs to the wharf office.

Wharf Office.—The wharf office is divided into the four offices of secretary's, shipping, goods and yard, and employs about 1,700 officials and employees.

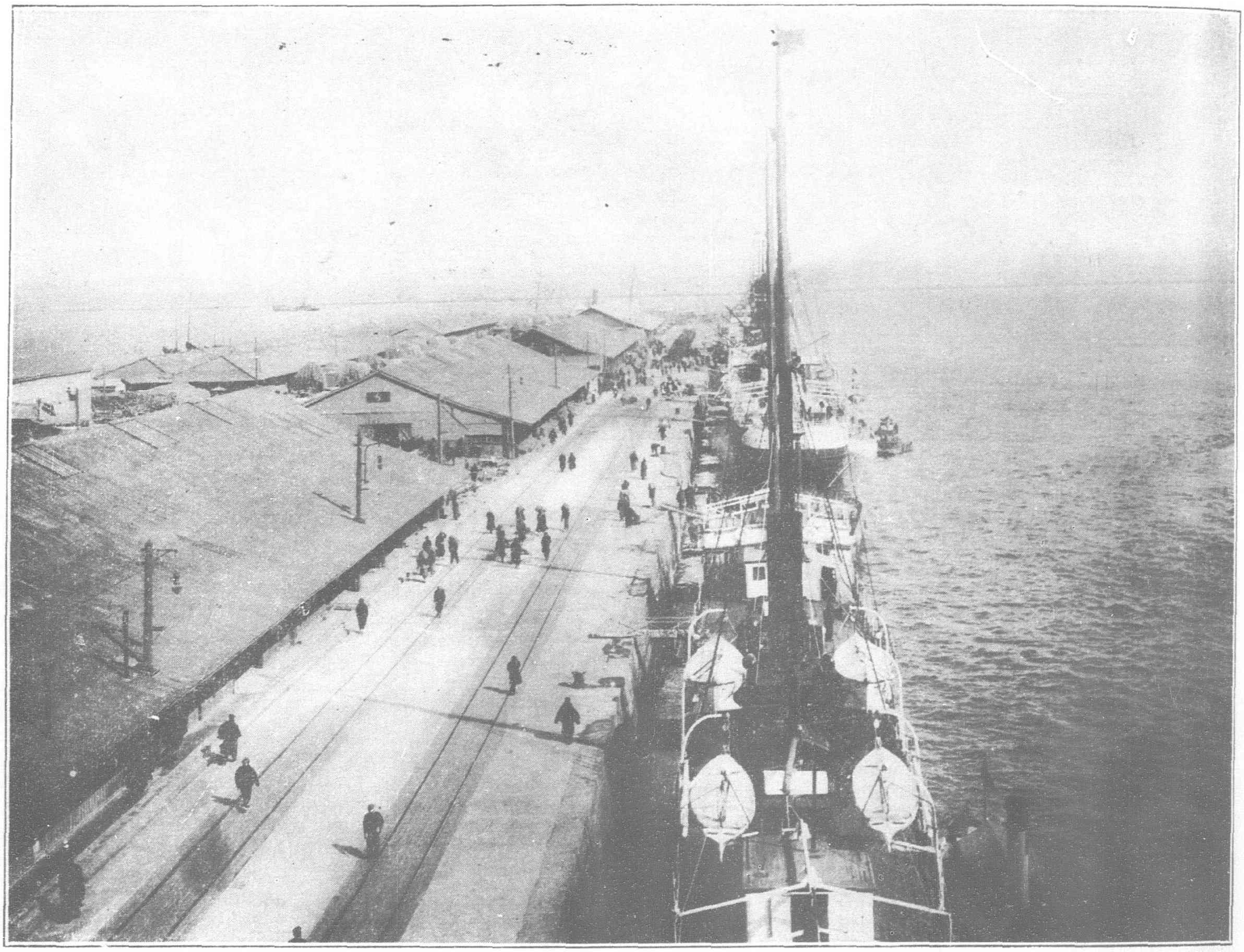
The principal businesses of the wharf office are cargo-work, terminal loading and unloading of railway goods, and warehousing. Sundry services appertaining to these businesses are also conducted.

Goods in storage (under custody, on application) are covered by fire insurance without the owners' expense.

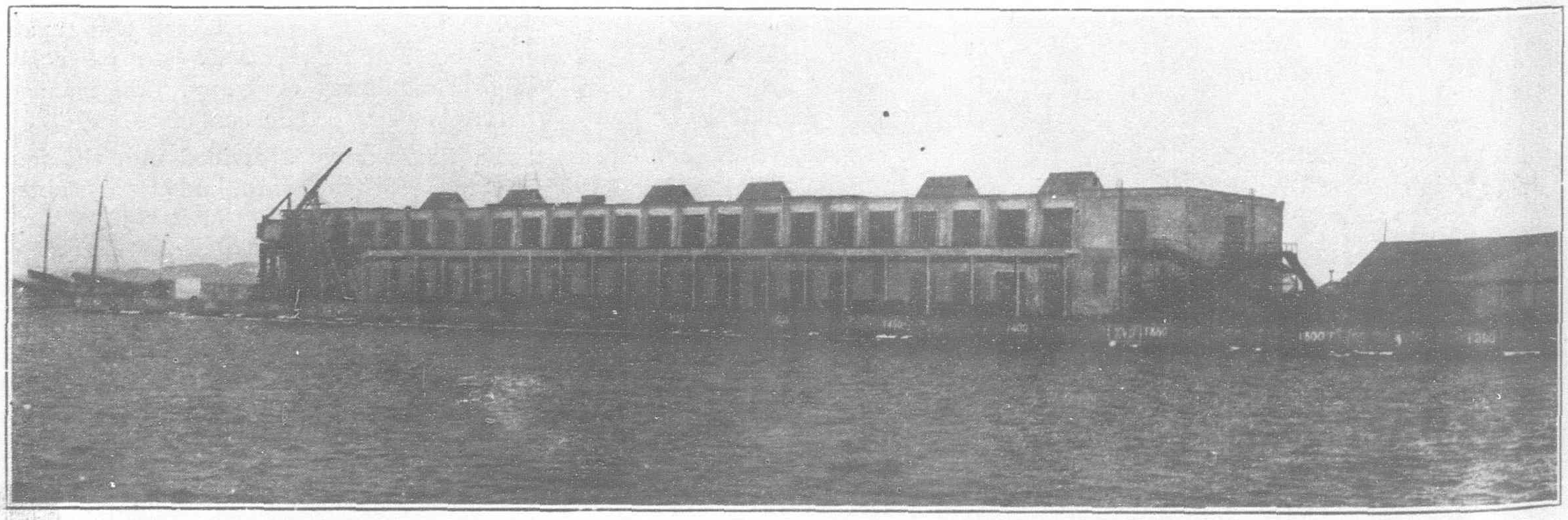
The different schedules of charges are as follow :

1. Baggage and freight tariff.
   Warehousing charges.
2. Regulations concerning cargoes and vessels.
3. Specific charges on the wharves.

THE BEAUTIFUL HARBOR OF DAIREN



Mail Steamers at the Dairen Wharves



One of the Several Permanent Concrete Wharves and Warehouses of the New Wharf System of Dairen Harbor for the Storage and Handling of the Immense Soya Bean Shipments which pass through the Port

EXTRACTS FROM STATISTICS:

	Vessels berthed. (Gross tonnage)	Exports & Imports. (Short ton)	Railway Goods Arrived & Despatched (Short ton)
1911 ..	2,662,943 tons.	1,407,761 tons.	1,195,271 tons.
1912 ..	2,872,122 ,,	1,557,320 ,,	1,427,169 ,,
1913 ..	3,556,250 ,,	2,105,985 ,,	1,995,385 ,,
1914 ..	3,838,078 ,,	2,104,590 ,,	1,976,951 ,,
1915 ..	3,461,530 ,,	2,270,036 ,,	2,203,777 ,,
1916 ..	3,095,257 ,,	2,331,446 ,,	2,308,781 ,,
1917 ..	3,118,715 ,,	2,988,856 ,,	2,662,517 ,,
1918 ..	3,473,397 ,,	3,447,699 ,,	3,092,468 ,,
1919 ..	4,380,920 ,,	4,223,775 ,,	3,554,613 ,,
1920 ..	4,864,904 ,,	4,038,851 ,,	3,834,899 ,,

BREAKWATERS:

East Breakwater	1,221-ft.
North ,, ...	7,400 ,,
West ,, ...	4,500 ,,
Total	13,121 ,,

ENTRANCES: East entrance (main) 1,200-ft. in width.
North ,, (for sailing ships and steam launches.) 400-ft. in width.
West ,, (,, ,,) 200 ,, ,, ,,

WATER AREA: Inside breakwaters, 3,135,000 square metres. (actually available about 3,036,000 s.m.)

BERTHING QUAY LINE:

	Length.		Length.	Total.
First wharf	2,525-ft.	Wharf "A"	1,225-ft.	13,450-ft.
Second ,,	4,400 ,,	,, "B"	900 ,,	
Third ,,	4,400 ,,			

BERTHING SECTIONS: 34 each, being 400-ft. in length.

INFLAMMABLE GOODS PIER: 1,135-ft. in length.

DEPTH IN BASIN: 30-ft. L.O.S.T. (low water ordinary spring tide.) Difference between high & low water, 8-ft.

STEAM LAUNCHES (for berthing & towing purposes): 14 in number.
Largest, 224 tons gross.
Smallest, 11 ,, ,,

LIGHTERS (built of steel):
12 in number.
Capacity .. {250 tons, 5 in number.
{100 ,, 7 ,, ,,

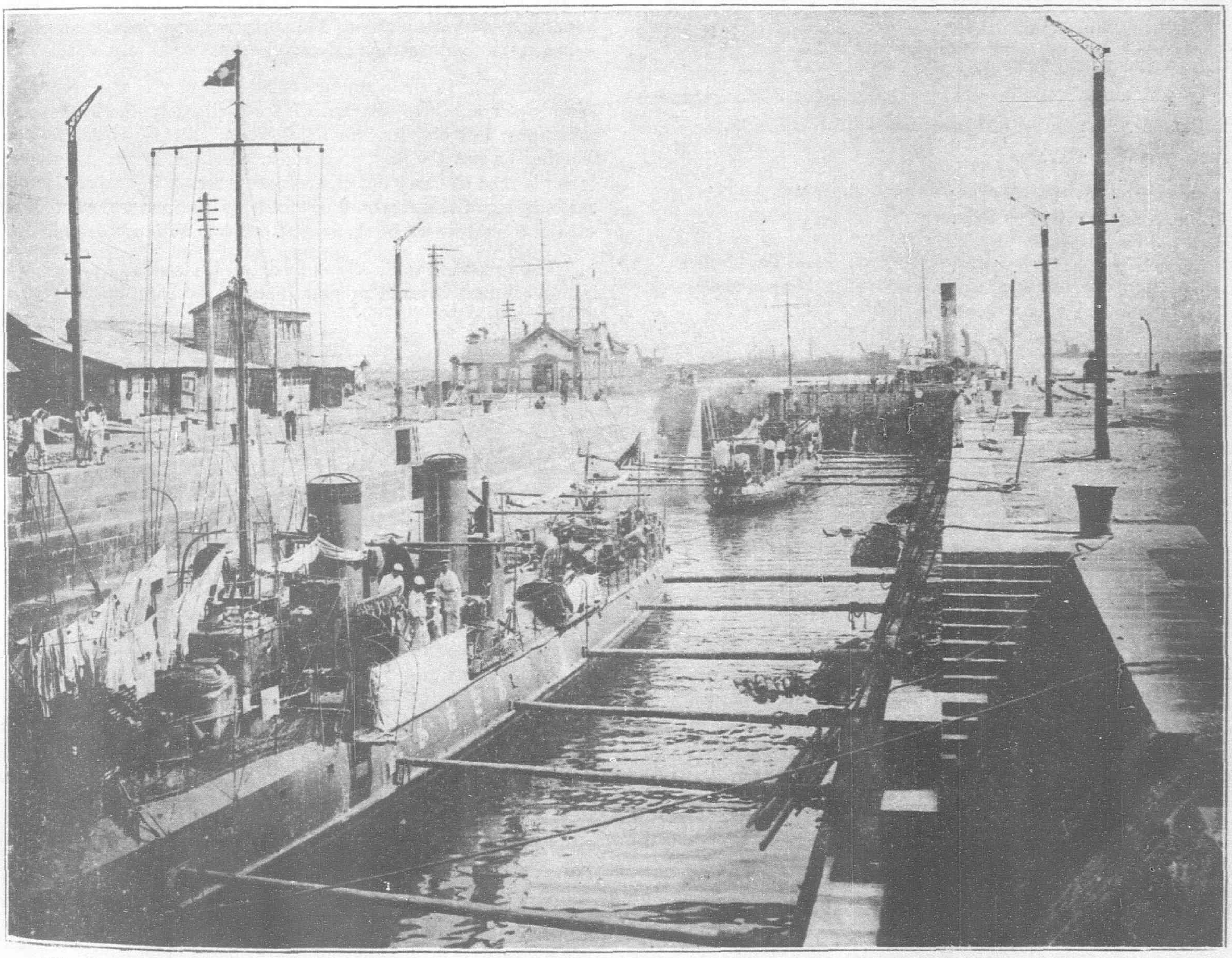
SHORE INSTALLATIONS. (Wharf compound being about 1,485,000 square metres).

WATER SUPPLY: Hydrant for each berthing section, capable of supplying about 60 tons per hour.

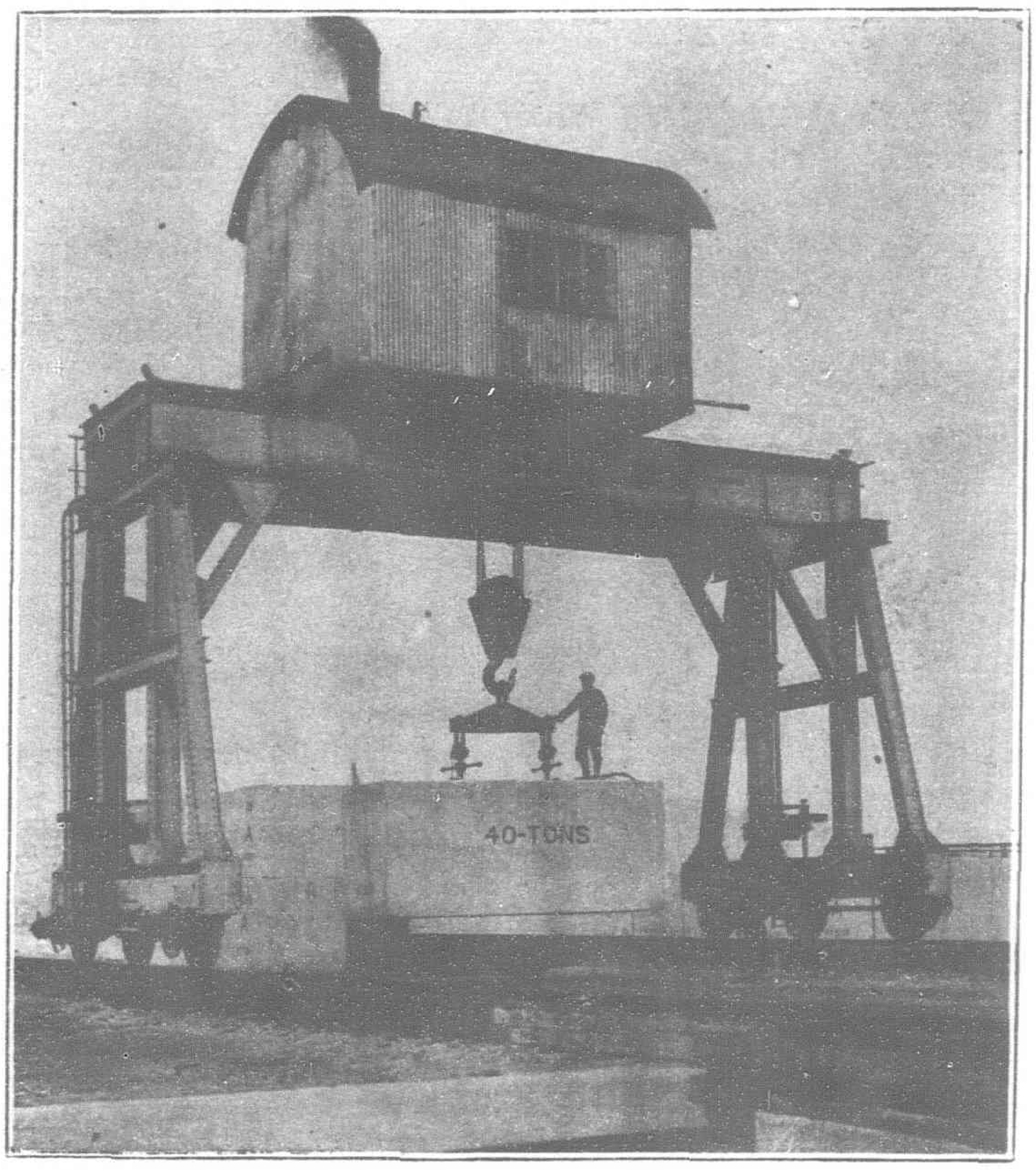
WATER BOATS: Two, each capable of supplying 30 to 50 tons per hour.

COALING EQUIPMENTS: Sections 1, 2 and 3 are set aside for coaling. Bunkers can be supplied direct from coal cars. Lighters also available.

(Coal yard on the coaling sections can store about 80,000 tons.)



The Dry Dock at Dairen, Owned by the South Manchuria Railway Company and Operated by the Kawasaki Dockyard Company, Ltd. Only Dry Dock in North China Capable of Admitting Ships up to 6,000 tons



Dairen Harbor Works: Gantry Crane Transporting a 40 ton Concrete Block

Cargo-working Equipments:

On the water; two 50-ton and three 25-ton floating cranes.

On shore: a number of 1½-ton, 3-ton, 15-ton and 25-ton cranes.

Cargo-working Capacity:

About 20,000 tons per day (10 working hours).

Warehouses and Goods Sheds:

	Number	Storage area.
Ordinary warehouses ..	57	246,444 square metres
Inflammable goods warehouses	9	7,227 ,,
Temperate warehouses ..	1	792 ,,
Bean oil tanks	5	each holding 120 tons.
Goods sheds	3	4,224 square metres
Total ..		258,687 square metres

Open-storage Grounds: About 330,000 square metres.

Maximum Storage Capacity of Wharf Compound: About 750,000 tons.

Highest storage record, about 600,000 tons.

Shifting Equipments: Total length of shifting sidings, 45 miles.

Locomotive engines	12
Goods cars (30 tons each)	250
Motor trucks (4 tons each)	4
Trailers (2 tons each) .. .. (accessory to above)	8
Trucks (2 tons each)	6
Tractors	2
Trailers (1 ton each) .. .. (accessory to above).	10

Carts, wheel-barrows, etc., are also used.

Daily shifting capacity (10 hours) about 20,000 tons.

Cargo Workers:

Chinese Coolies.

Average daily workers; about 6,000-8,000.

per capita working capacity; about 5 tons.

Contract suppliers: Fukusho Co. (sole contractor)
They have coolies' quarters accommodating about 13,000 coolies.

Dry Dock: One (under management of Kawasaki Dockyard Co., Ltd., and owned by S. M. R. Co.)

Docking capacity .. .. .. 6,000 tons gross.

Osaka's Road Program

The city of Osaka will soon begin an extensive road building program which will extend over a period of ten years and more than 40 million yen will be spent if the plans as proposed by the Osaka city planning commission are accepted and passed by the home department of the national government.

Under the plans as put forward by the city authorities ten main highways radiating from Osaka will be thoroughly made over. The new highways will be of macadam. This investigation has been going on for the last several months with Mayor Ikegami taking a leading part. He is chairman of the city commission. The plans also state that the new roads will be from 48 to 72-ft. in width, this depending upon the amount of traffic which will have to be accommodated. This program is primarily intended to improve the roads in the outlying districts of the city.

According to their announcement the city is also planning to enter upon another program of approximately the same size in rebuilding the city streets of Osaka. This is dependent upon whether or not the first program is accepted by the government. It is planned to carry out the second program in conjunction with the building of the proposed new railway station for Osaka. If the station is built it will be the largest railway station in Japan.

The following table shows in detail the roads which are to be improved under the first program and the expenditures for each:—

Lines	Approximate length in ken	Expenditures
Denpo-Amagasaki-Osaka ..	1,932	Y.7,159,087
Osaka-Itami	1,921	1,224,604
Osaka-Ikeda	4,519	8,741,588
Fuita-Osaka	4,009	2,083,258
Sumiyoshi-Osaka	1,551	1,254,501
Osaka-Maioka	1,573	2,275,398
Osaka-Nara	2,419	1,324,955
Tennoji-Kuroe-Osaka ..	3,385	2,559,967
National Road No. 2 ..	2,690	2,083,258
National Road No. 16 ..	3,377	5,927,637

New Typewriter Manufacturing Co.

On March 31, 1922, the Toyo Typewriter Kabushiki Kaisha, with a capital of Y.1,000,000, was organized in Tokyo, to manufacture typewriters in Japan to supply the demand for foreign language keyboards. One-fourth of the capital is already paid-up.

Electrical Developments in Japan

1. Diado Electric Power Co., Ltd.

IN February, 1921, the Osaka Soden Kabushiki Kaisha, the Nihon Suiryoku Denki Kaisha and the Kiso Denki Kogyo Kabushiki Kaisha, completed an amalgamation of interests, and organized the Daido Denryoku Kabushiki Kaisha to take over their properties and business, with a capital of Y.100,000,000. To-day, the outstanding paid-up capital of this company is Y.44,320,000. As the amalgamation is composed of three different companies, the paid-up shares issued are of different valuations ; one issue of 372,000 shares being paid up to the amount of Y.30.00 on a Y.50.00 face value, another issue of 120,000 shares is paid up to the value of Y.25.00, and the balance of the shares, 1,508,000, are paid up to Y.20.00. At the end of 1921 the company had outstanding Y.10,000,000 of debentures, besides ordinary loans amounting to Y.6,152,728.

The Daido Denryoku K.K. has under construction, or planned for early construction, some eight power plants which will generate 217,000 kilowatts in all. These plants are situated on the Kiso and Yasaku rivers. The entire construction program is to be completed by the end of December, 1925.

A detailed list of the power houses to be built follows :

(1) Kisuhara power house, in the Yasaku River, 6,000 kilowatts, began operations on February 18, 1922.

(2) The Okuwa power house, on the Kiso River, 11,000 kilowatts, will be completed in August this year. The whole generating capacity of this plant is under contract to the Kansai Denki K.K.

(3) Suhara power plant, on the Kiso River, 19,150 kilowatts, is now under construction. When completed this station will transmit its power to Osaka, together with the power generated at the Okuwa station.

When the plan to use the power generated in Stations 2 and 3 is put into operation it will cause a scarcity of power in the Nagoya district. This scarcity will be met by new power houses under construction, and from the Yasaku River plants.

(4) Shizumo power plant, on the Kiso River, 12,600 kilowatts now supplies Nagoya with its whole capacity.

(5) Nishikachihara power plant, on the Kuzuryo River, 7,200 kilowatts, supplies 2,000 kilowatts during the day, and 600 kilowatts at night to the Echizen Denki K.K., the Kyoto Dento K.K. and the Taisho Denki K.K. The balance of the power is used to manufacture caustic soda at the Takeu Factory.

(6) Kema power plant, coal burning. 12,500 kilowatts, now under construction and will be completed this year.

(7) Dokusho power plant, coal burning, 40,000 kilowatts, now under construction.

(8) Oi power plant, coal burning, 30,000, now being planned.

The company also contemplates erecting power plants on the Kiso River at, (1) Momoyama, (2) Ochiai, (3) Kasagi, (4) Nishikitsu and (5) Imawatari. There are also three coal burning plants in contemplation, at Hanabusa, Higashi Kachihara and Shitauchinami.

TRANSMISSION LINES :

(1) Sixteen miles between the Okuwa power plant, and the Nakatsugawa transmission station have been completed.

(2) Between Kiyosu transmission station and the Osaka transformer station, the line is now being erected.

(3) Between the Kiyosu transmission station and the Dokusho power plant, a survey is now being undertaken.

(4) Between the Kiyosu transmission station and the Osaka transformer station preparation is now being made to erect a line for telephone service.

The company now owns completed transmission lines for telephone service, between

(1) Shizumo power plant, and Rokugo transformer station.
(2) Kushihara power plant, and Mizunami transmission station.
3. Kushihara power plant and Mizunama transformer station.
The entire stretch of wires is 97.47 miles, of special high-pressure lines.

TO INSTAL RADIO TELEPHONE SYSTEM :

In addition to the above installations the Daido Electric Power Company is erecting the first radio telephone system in Japan between Osaka and the Kiso district, opening communication for 150 miles. It is to be for the use of the company, although it will be thrown open to the public in due time. Okuwa, in Kiso, on the Central Japan railway line, will be the starting point of the wireless line and a link of wireless communications will be established connecting Nagoya and Osaka.

The application has already been filed, and, as soon as permission has been granted, the work will be commenced. According to the plans and specifications the machine used will be the De Forest system of wireless telegraphy and telephony, form O T 401. The height of the poles will be about 150-ft., the power is 2 kilowatts and 1,800 volts. The starting point in Okuwa-mura, Nagano prefecture, is to be located in the generating station of the company, the receiving station in Nagoya is to be located in the branch office premises in Shichiken-machi, Nagoya city, and in Osaka in the transformation station at Furukawa Bashi, which station will be completed shortly.

While, at present, the distance to be covered is 150 miles, if the result be successful, a receiving station will be established in Tokyo and public service may be commenced in due time.

BUSINESS RESULTS :

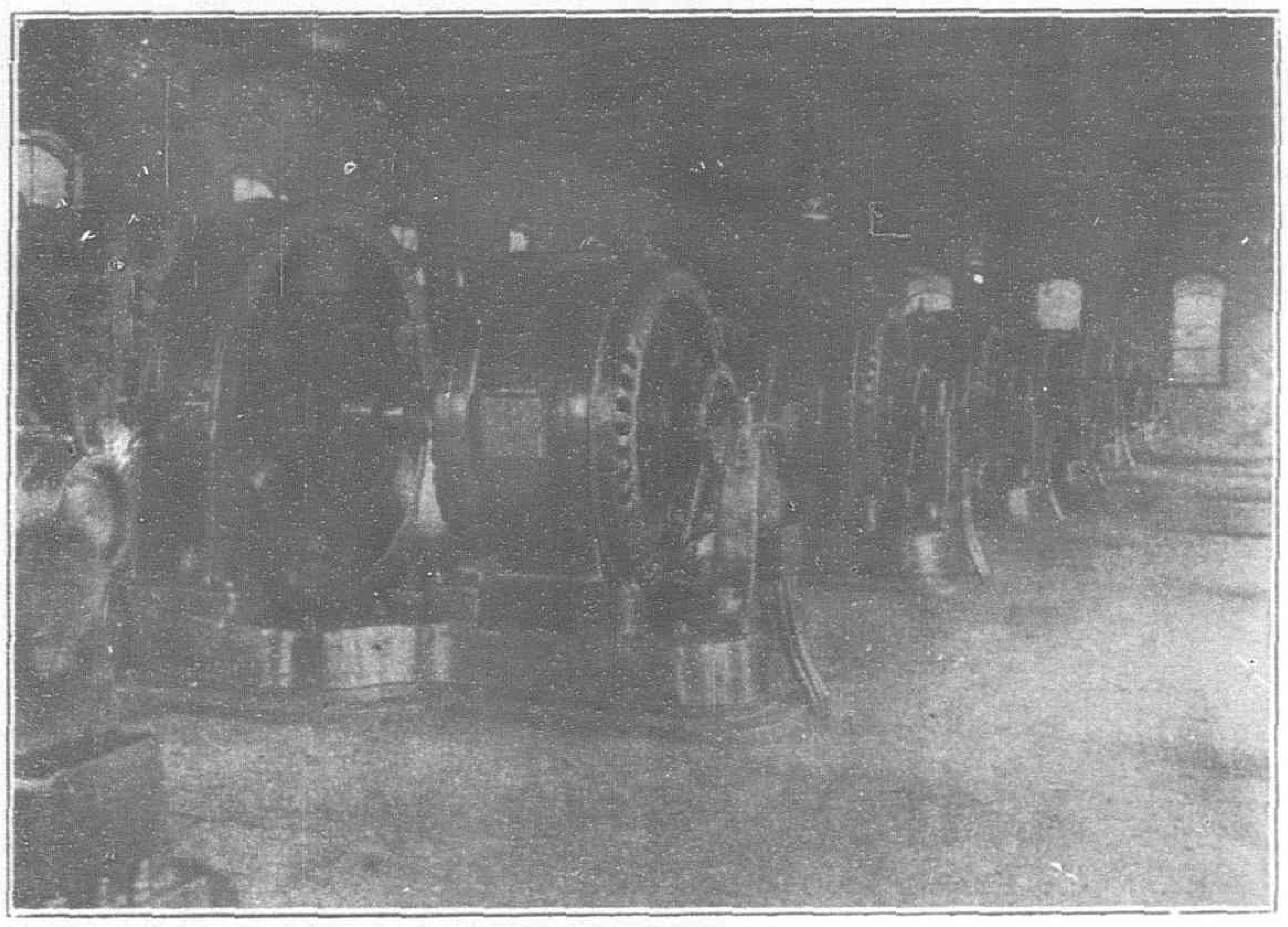
Last year the Daido Denryoku K.K. made profits of Y.856,260, to which was added Y.72,000 surplus carried over from the term before. Out of the total amount of Y.928,000 available to be treated as profits, Y.43,000 was taken for legal reserve, Y.50,000 for bonus for officials and Y.825,250 was paid in dividends at the rate of 6 per cent. per year, and only a little more than Y.10,000 was carried as surplus to the present term of business.

The company's officials report that it is increasing its income this term by some Y.500,000. Income from power sold is estimated at Y.1,616,000 while interest and profits on securities held will yield another Y.200,000. Miscellaneous income is estimated at Y.90,000, making the grand total of income for the present term, about Y.1,906,000. Something like Y.130,000 must be deducted from this amount for costs of operating power plants, Y.70,000 for taxes, and other expenses Y.505,000. The total expense for this term to be about Y.705,000.

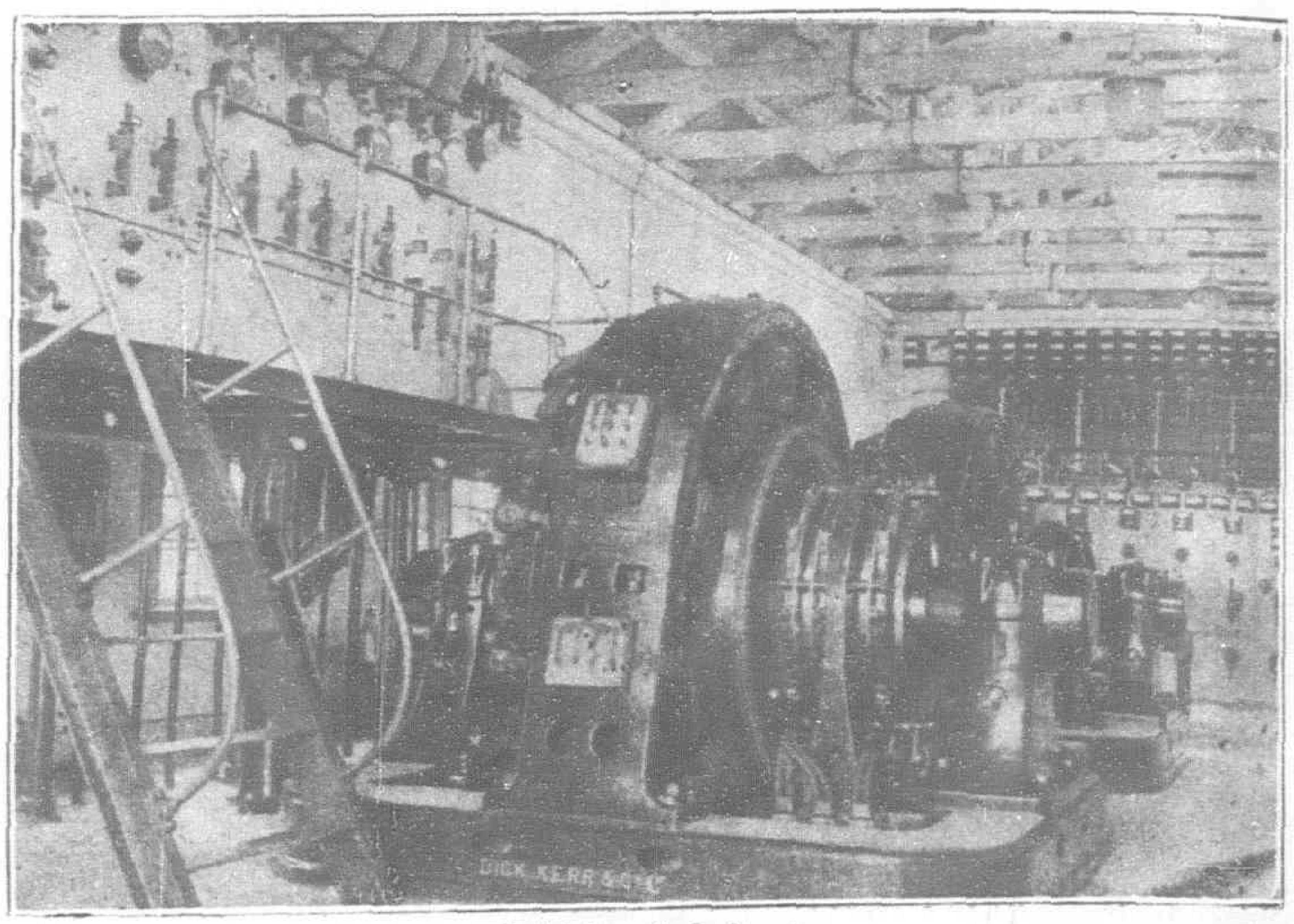
Net profit, therefore, would be something in excess of Y.1,201,000, in addition to the amount carried forward as surplus to this term, Y.10,000. It is proposed to put Y.65,000 to legal reserve, Y.65,000 for bonus to officials and Y.1,046,850, is to be distributed among the shareholders at the rate of 6 per cent. a year. This will leave Y.34,000 surplus to be carried to the next term.

SOME POWER STATIONS OF THE TOKYO ELECTRIC COMPANY

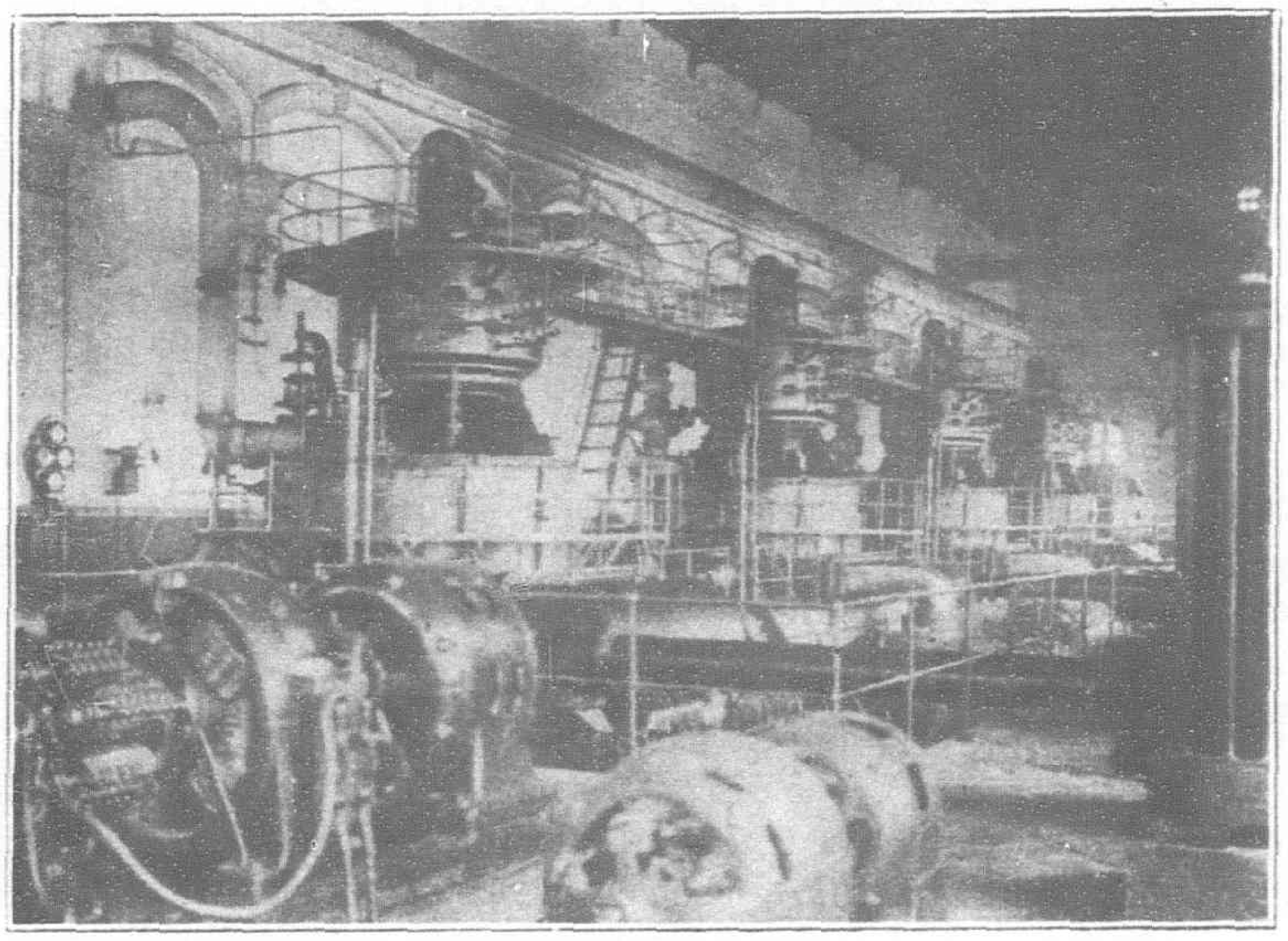
This Company has issued a call on its shareholders for Yen 20,000,000 for new construction



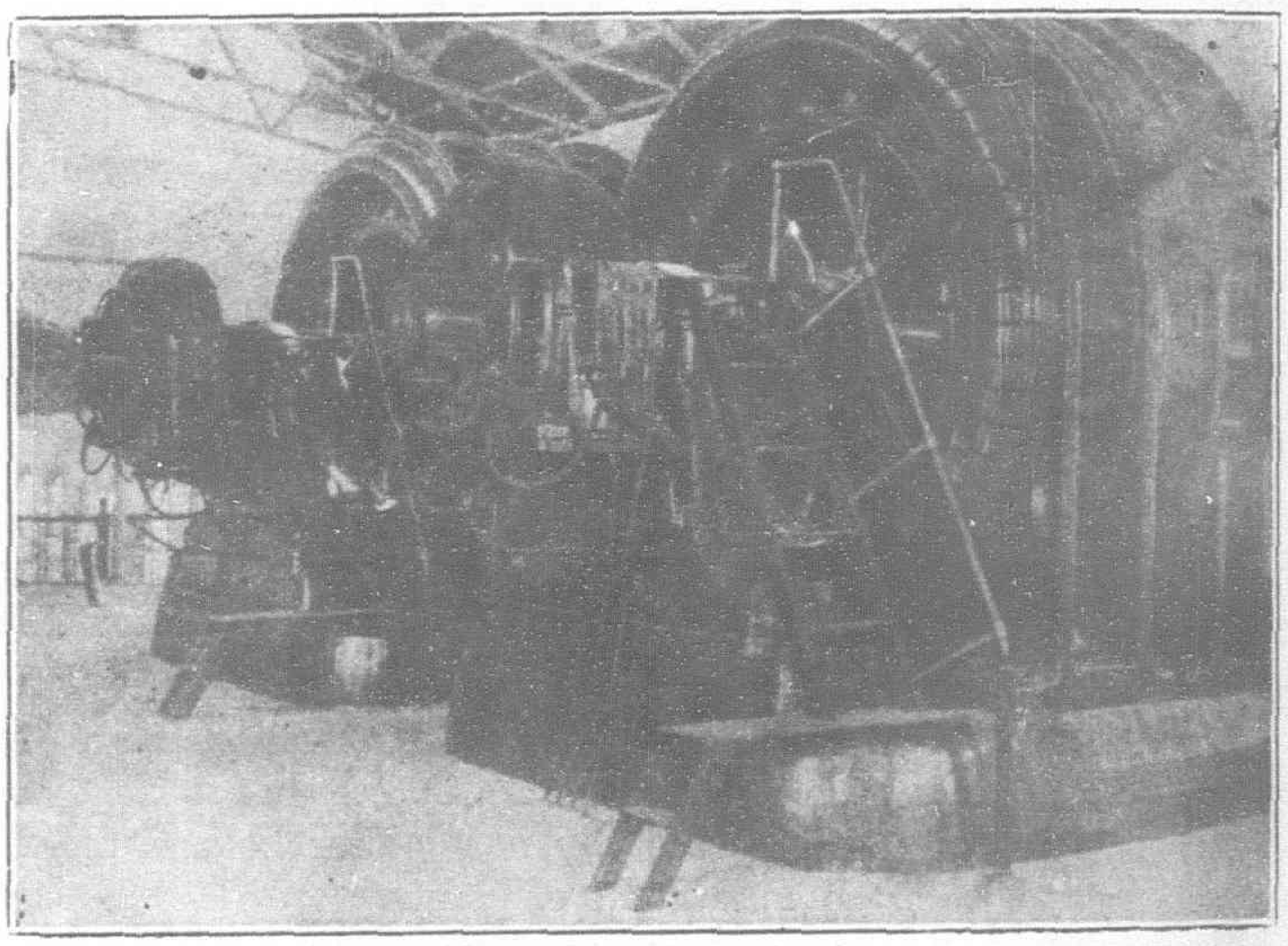
Yokoami Sub-Station



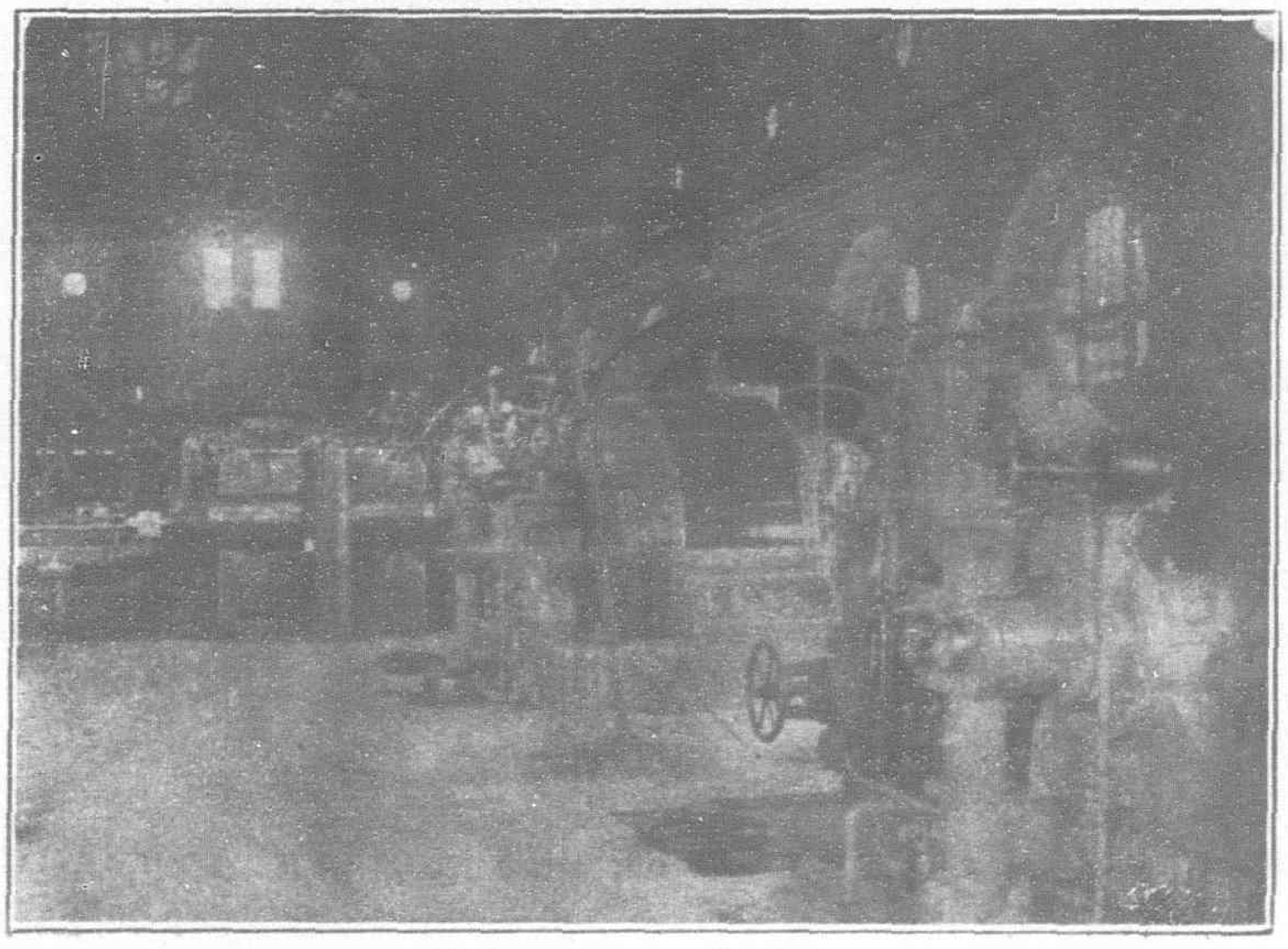
Oshicho Sub-Station



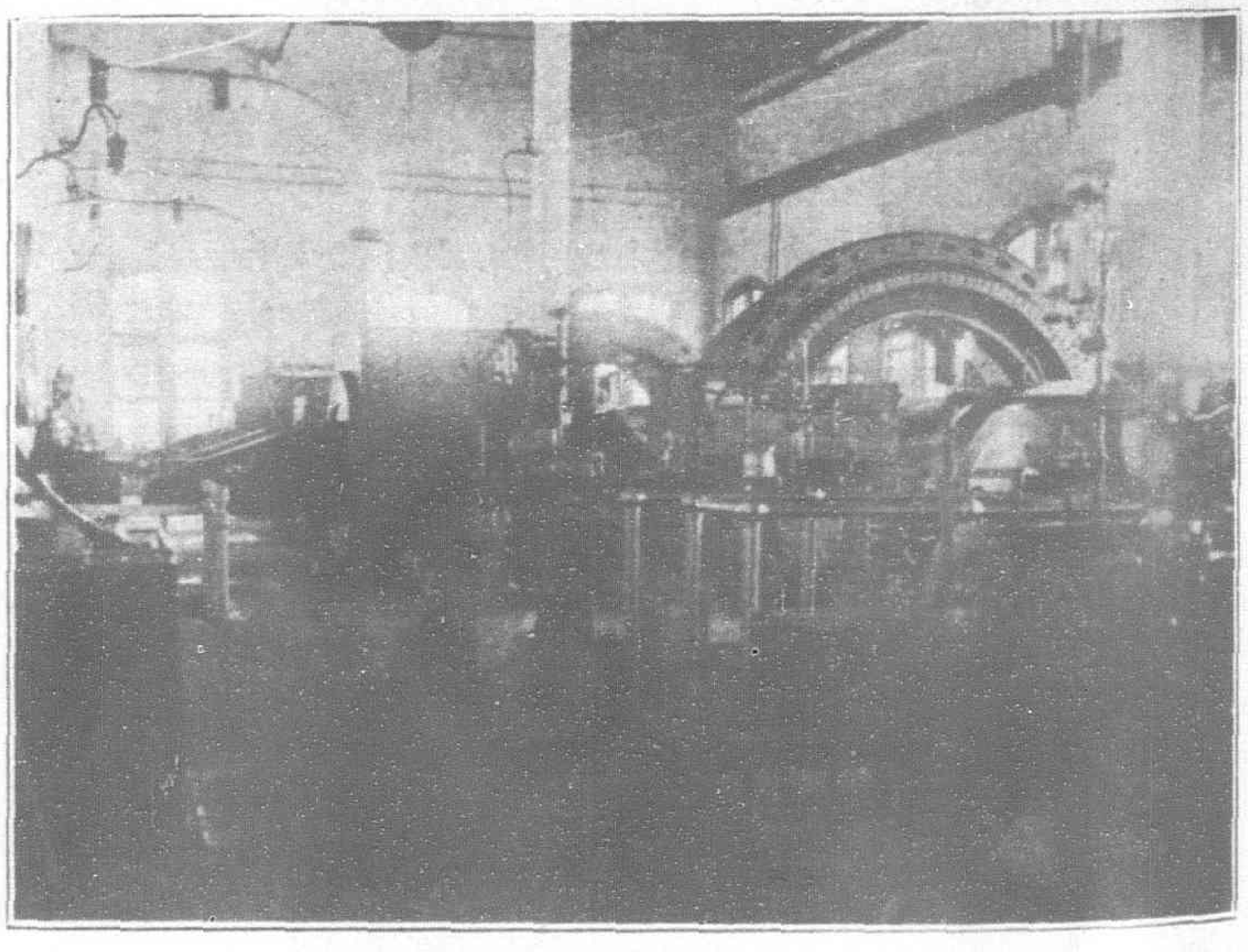
Fukagawa Power Station



Yurakucho Sub-Station



Shibuya Power Station



Shinagawa Power Station

THE FUTURE OF THE COMPANY:

The cost of construction of the company's water power plants is now estimated at Y.572 per kilowatt generated. This compared with other water power companies is very low. But as the company's area of supply is situated as a great distance from the source of power, it is required to erect long transmission lines. This increases the cost of construction per kilowatt generated to Y.750.00 or Y.760.00.

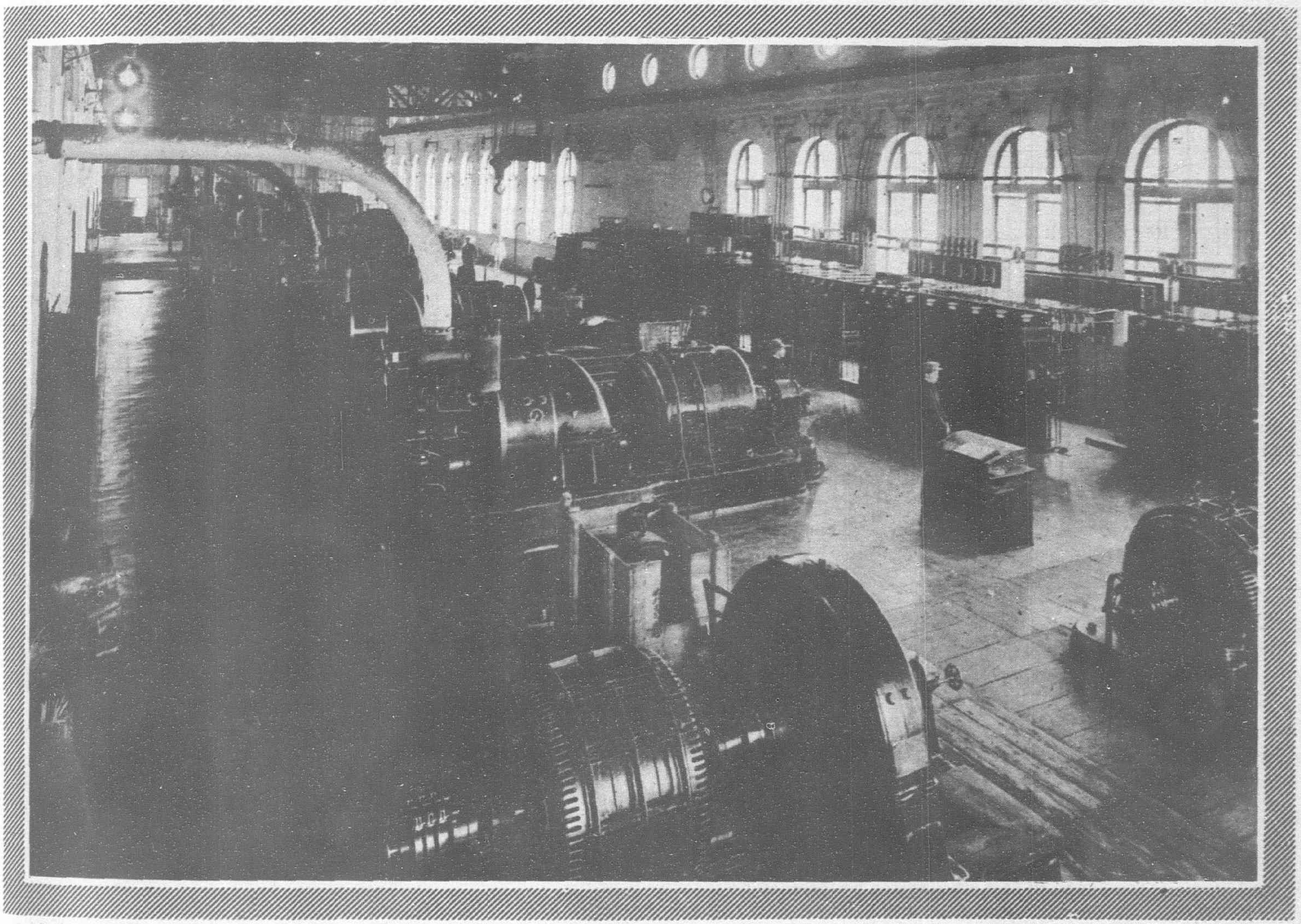
As a matter of fact the company's officials are finding that they do not need such a large amount of money to erect the transmission lines. But the nearer the lines come to Osaka the greater the expense of erection, as the land rental per pole is very high near that city. The annual rent per 36 sq. ft. of land is Y.3 to Y.5 a year. Because of the size of the iron towers erected some five to six times that amount of land is required so that the annual rental per pole is something like Y.20 to Y30. Such an annual charge would inconvenience the finances of any company.

When the Daido Electric Power Co., Ltd., begins transmitting power to Osaka that important industrial centre will be permanently relieved from the constant lack of power which is one of its competitive drawbacks to-day.

Nevertheless the Daido Denryoku has many troubles and hardships to face yet. Since its organization the public has looked on this company with a great deal of doubt. Accordingly the responsibilities of its directors are by no means slight. The success of the company is greatly to be desired because it plans important assistance to the development of Japanese manufacturing industries through its intention to supply Osaka with power.

2. Tokyo Electric Light Company

The Tokyo Electric Light Co. (Tokyo Dento K.K.) intends to call up Y.5.00 on each of its first issue new shares, and Y.7.50 on each of its second issue new, third issue new and fourth issue new shares, before the end of June, 1922. The total sum which this call will yield is estimated at a little more than Y.20,000,000.



Generating Room of the Kyushu Electric Light and Traction Company, equipped with General Electric Steam Turbine Sets: This company proposes to increase its capital Yen 37,400,000, a large proportion of which will be expended in new construction

However all this may be, the fact of the matter is that this company with its capital of Y.100,000,000 is the largest among Japan's water power companies. It is the expectation of the promoters of this company that it will eventually divide the exploitation of Japan's water power with the Nihon Denryoku K.K.

There are twenty company directors, and nine auditors. Mr. Momosuke Fukuzawa the most important figure in Japan's electric power industry is the president of the company, and Mr. Jiro Masuda is the vice-president, while such extremely capable business men as Mr. Koki Ota, Mr. Seiryo Yamane, Mr. Shigeru Kondo and Mr. Ju Sekiguchi, are all members of the board of directors.

The company intends to use the money in the following construction works:—

(1) Constructing transmission lines and transformer stations of the Shin-yetsu Denryoku K.K.

(2) Constructing the third power station on the Fuefuki river, to be completed this year.

(3) In completing the Komatsu power station, this year.

(4) To complete payments to the Keihin Denryoku K.K, (Keihin Electric Power Co.) with which the Tokyo Dento has some contracts in regard to investment.

The transmission lines of the Sin-yetsu Denryoku alone will require from Y.12,000,000 to Y.13,000,000 of this capital increase. It is accordingly confidently believed in electric circles that this company will be obliged to make another call on its unpaid capital after this call has been paid in.

3. Kyushu Electric Light Company

The Kyushu Denki K.K. in order to pay outstanding debts of Y.3,000,000 to the Mitsui interests, and Y.1,200,000 in company debentures, will call up the balance of its unpaid capital on June 1, 1922. The call will be for Y.12.50 a share, and will bring in Y.4,900,000.

It is reported that the company needs from Y.4,500,000 to Y.5,000,000 to complete its hydro-electric power stations at Oyama, Imahata and Chinda, in Kyushu, and also to put the coal power station at Fukuoka, with an estimated capacity of 10,000 kilowatts, into operation.

Other plans of this company are to erect power stations along the Oita River, the Kuma River and the Chikugo River, all in Kyushu. It also intends to make a large investment in the shares of the Kyushu Soden K.K. (Kyushu General Electric Co., Ltd.), when it is eventually organized. A large sum of money is accordingly needed by this company in the near future. To meet these needs it is reported that its present capital will be increased from Y.37,400,000 to Y.74,800,000, shortly after the final payment of the old capital is satisfactorily accomplished.

4. The Gunma Electric Light Company

The Gunma (prefecture) Denki K.K., was established in July, 1919, and it was the intention of the promoters to complete the first part of the power works before the end of 1921. But the bad weather delayed operations at one time to such an extent that the works were more than six months behind schedule. Now it is reported that they will be completed before the end of this half year, June 30, and that for at least five months in the second half year the company will be able to operate its power station at Kanai.

The Kamai hydro-electric power plant is connected by a high-pressure transmission line between Kanai, and Kawasaki, in Kanagawa prefecture, which is 85 miles long. This power station is built to generate 10,800 kilowatts at ordinary stages of water, and 7,800 kilowatts when it is at its lowest stage.

Trials of the company's equipment will be begun in June, 1922.

This company has a contract with the Keihin Dentetsu K.K. (Yokohama-Tokyo Electric Ry. Co., Ltd.,) for the supply of 6,000 kilowatts from the Kanai power station. The balance of the power generated will be sold in small amounts throughout Kanagawa prefecture in the districts between Kanai and Kawasaki.

Estimating the charge for power at 3 sen a kilowatt which is the minimum charge in the Kwanto (Eastern Japan) district, at the lowest stage of water this company's income should be about Y.455,000 for the five months of complete operation next half year. If the estimate is made at the highest stage of water, income should reach Y.550,000. Estimating expenses of operation at 20 per cent. of income, profits should amount to Y.430,000 or Y.440,000. This would be a profit rate of fourteen per cent., but it is reported that the company will confine dividends to 8 per cent. for the time being.

5. Inawashiro Hydro-Electric Company

At a general meeting of its shareholders held in Tokyo on the twenty-eighth of April, the Inawashiro Hydro-Electric Power Company, one of Japan's most important electric enterprises, decided to increase its capital from Y.21,000,000 to Y.50,000,000.

The capital increase will be effected in the following manners :—

(1) The present capital of Y.21,000,000, will first be paid-up in full by calling for a seventh and last payment of Y.10.00 a share on all shares issued.

New shares to the number of 580,000 will be issued, to the face value of Y.29,000,000, each share being Y.50.00 par.

(2) Of this total, 525,000 shares will be parcelled out among the present shareholders, before November 1, 1922, but it is desired to keep the distribution put off until the last moment legally permitted. One and a quarter shares of new stock will be allotted to each share of old stock.

(3) The balance of 55,000 shares will be distributed among the members of the company's office staff and other employees, and other persons who have rendered services to the company worthy of such recognition.

The purpose for increase of capital is found in the company's amended plans for completing the following projects, now under way, or soon to be begun.

	New Plan	Old Plan
(1) Deepening Lake Hinokibara ..	Y. 957,000	Y. 470,000
(2) Increasing equipment at No. 3 Power Station	5,448,000	5,010,000
(3) Increasing equipment at No. 4 Power Station	8,429,000	2,620,000
(4) Deepening Lake Inawashiro ..	4,028,000	3,750,000
(5) Equipment, etc., at Tabata transformer Station	1,780,000	1,640,000
(6) High-pressure transmission lines ..	6,560,000	8,330,000
(7) Completing Odera business office ..	448,000	—
(8) Reserve	1,350,000	2,180,000
Total	Y.29,000,000	Y.24,000,000

Sprinklers in Sakhalin

It may be remembered that, on the conclusion of the Russo-Japanese war, the southern part of the Island of Sakhalin was ceded to Japan. Previously the whole of it had belonged to Russia, and was used by that country as their great convict station, and readers of Charles H. Hawe's fascinating book "In the Uttermost East" will remember his vivid description of the horrors of life in that far-off settlement.

Since taking possession of the southern portion of the island, the enterprising Japanese have developed there the manufacture of wood pulp, and the illustration on this page shows the main street of a village on its west coast in which one of these factories is situated. In the foreground to the right is Mr. John Birtles, the English engineer, who is superintending the erection of the Grinnell automatic sprinkler installation in the pulp mill, together with two Japanese gentlemen connected with the same undertaking.

The photograph, which was taken on November 1st, 1921, gives some idea of the severity of the climate even in earliest winter.

Irrigation Development in Siam

IN the beginning of the year 1913, the preceding rice harvest having been a very bad one, the question of irrigation, for some years in abeyance, began once more to occupy the attention of the government. As a result of investigations into the matter extending over many months, the minister of agriculture submitted a note to the king strongly advocating the undertaking of a scheme of irrigation in the Menam valley. In this note it was suggested that a foreign irrigation expert of reputation be engaged to report on the situation and, if his report should prove satisfactory, to initiate work. Shortly afterwards, the minister of agriculture took measures to secure the services of an irrigation expert of wide recognized experience, which measures resulted in the loan of the services of Mr., now Sir Thomas, Ward, C.I.E., M.V.O., by the government of India.

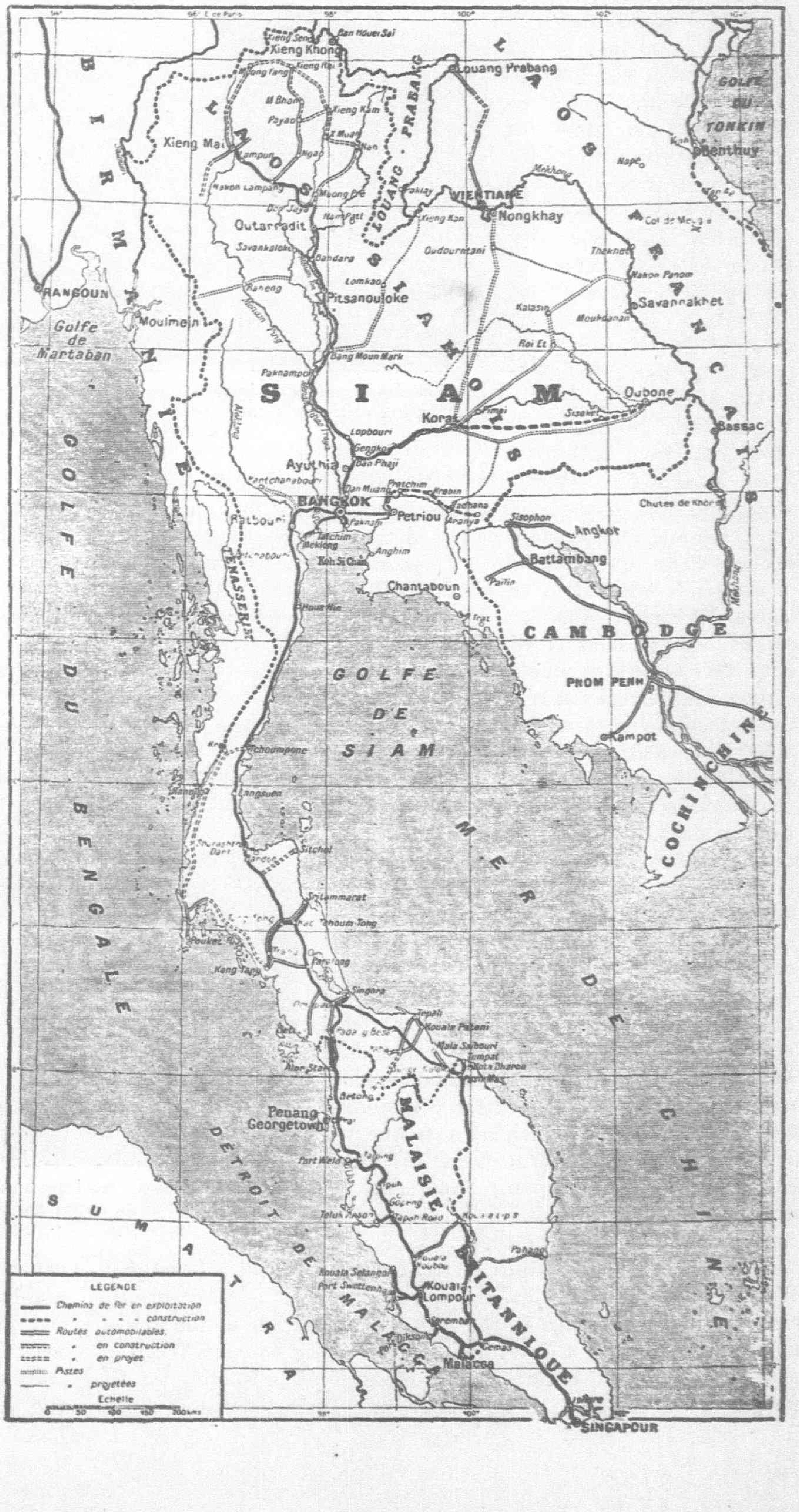
Sir Thomas Ward arrived in September, 1912, with selected assistants, and immediately began to investigate, the plans and estimates formerly compiled in the irrigation department being placed at his disposal. An office was established and a staff of officers was collected and before long parties of surveyors and levellers were out in all directions verifying the old plans and compiling new. Sir Thomas himself traveled extensively, and by actual observation and with the help of his assistants soon acquired an intimate knowledge of the country and the conditions affecting irrigation.

By about August, 1915, the whole question had been worked up very exhaustively and with the assistance of various departments of government, notably the war department (krom penti) and the Mahatai, many maps had been prepared and a mass of statistics regarding population, crops, rainfall and revenue had been collected and assimilated. Sir Thomas Ward then began to draw up a report and projects, but meanwhile steps were taken to form an irrigation department in preparation for the moment when actual construction should begin. Mr. R. C. R. Wilson, of the Punjab irrigation service who accompanied Sir Thomas Ward to Siam, was appointed director, and an officer was engaged in India for the position of deputy director. Arrangements were made to fill other appointments of the department from the staff which had been working on the projects.

Sir Thomas Ward delimited six different areas which could be irrigated (each by means of its own self-contained system of canals) by the three rivers of central Siam and by each of the three distributaries of the Menam Chao Phaya; and he found and fixed the boundaries of a central part that extends from Ayuthia to the sea, too flat for irrigation except to a limited extent but which could be developed by the further construction of navigation and drainage works similar to those which had already been constructed by the irrigation department. He prepared preliminary projects explaining the relative merits of each of these integral parts and set forth the work to be done to obtain the ultimate full development of the country on the most modern and up-to-date lines. In doing this Sir Thomas explained that the attainment of such full development must occupy a long period of years and entail a total expenditure of something like 150 millions of badh and would moreover become necessary only after Siam should have acquired a population sufficiently numerous to occupy all the land thus made available.

Sir Thomas Ward advocated, to meet immediate needs, the execution of a selection of his separate projects, giving preference to those which seemed of most importance, at a total cost of some 22 or 23 million badh; that being about the sum which Sir Thomas was given to understand that the government desired to spend to attain the object that they had in view, viz., to enable Siam to maintain, against the increasing competition of neighboring rice-growing states, the position hitherto held by her in the markets of the world. Sir Thomas estimated that such a sum would provide for the immediate expansion necessitated by the ever increasing energies of the people consequent on the just and stable rule that they now enjoy.

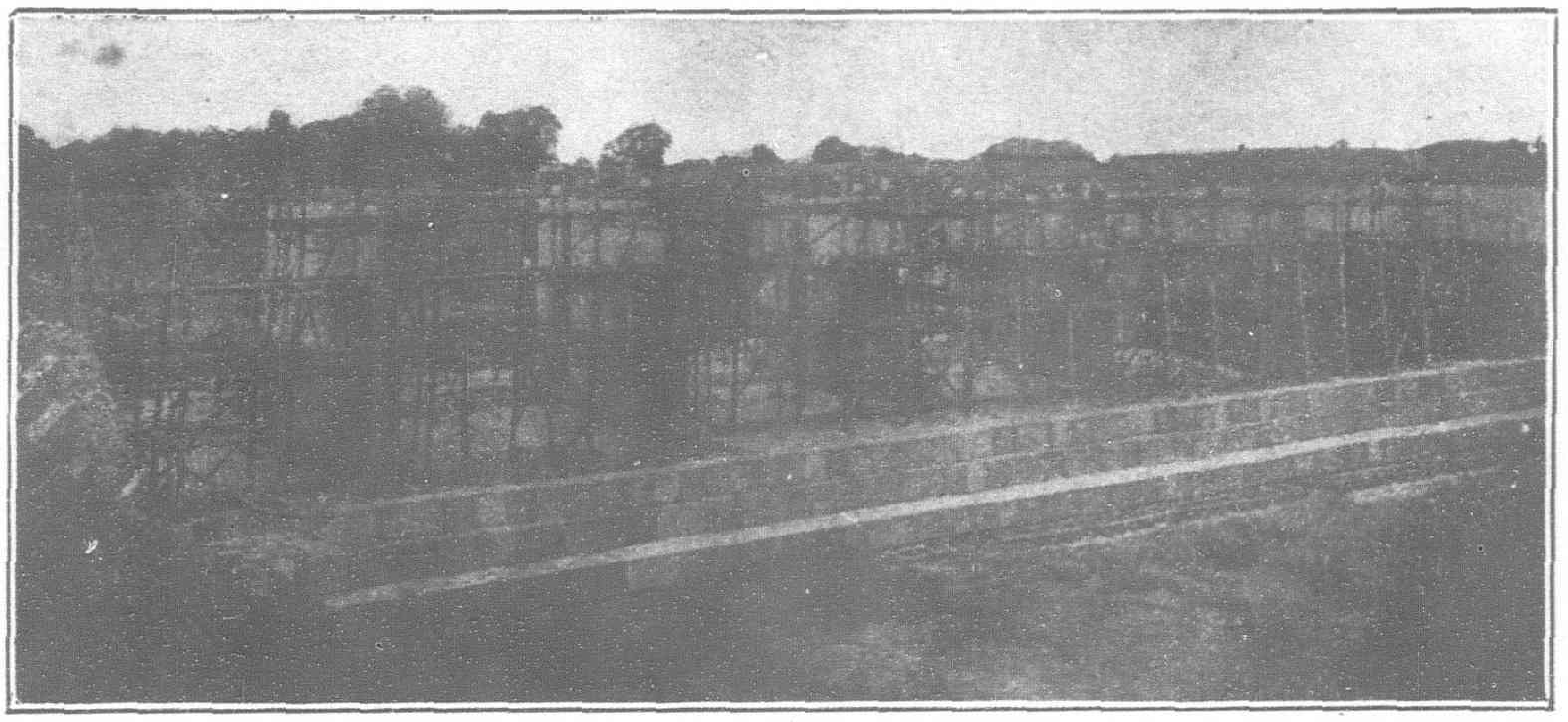
After careful consideration of the immediate needs of the different tracts of country from the point of their irrigation potential-



ities, and of the views held by the statesmen of Siam, Sir Thomas Ward advised the immediate sanction of the following projects :—

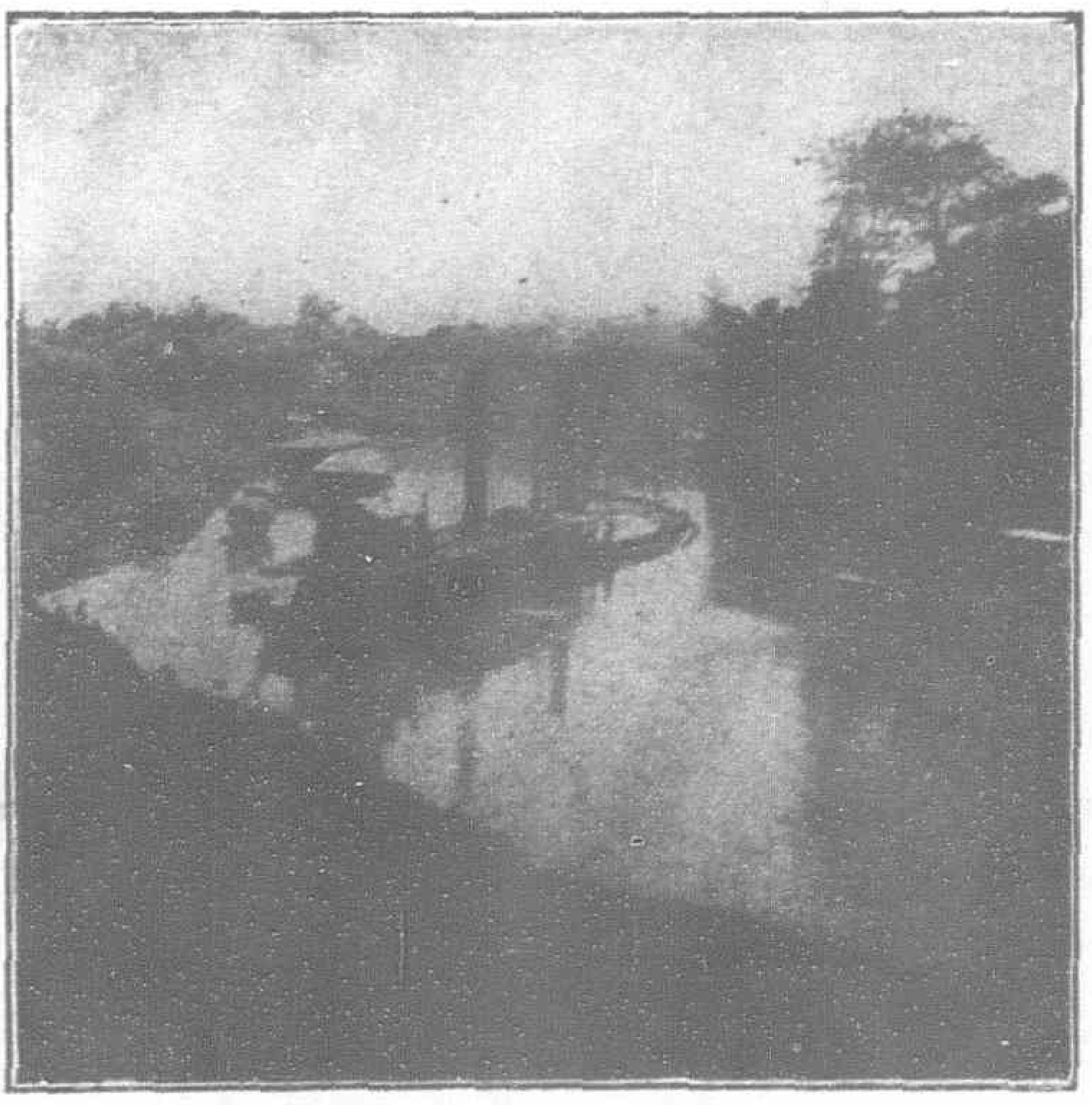
	Ticals.
(1) The Subharn canal	7,500,000
(2) The Bhejaburi east canal	1,500,000
(3) The Prasak south canal	11,500,000
(4) Hill irrigation (Circle Bhayabh)	1,500,000
(5) Navigation and drainage work in the flat plain from Ayuthia to the sea on both banks of the Menam	1,250,000
Grand Total ..	22,750,000

The following are points of interest concerning these various projects :—



Irrigation development is progressing in the Kingdom of Siam under the direction of the Royal Irrigation Department. This photograph shows the construction of a large barrage in connection with this development

No. 1. *The Subharn Canal.*—Sir Thomas Ward found from the records of the river gauge maintained at Wat Dahad on the Menam near Jainadh since the year 1904, that the water levels obtaining annually between the months of July and December would suffice for the irrigation of certain areas of land, if canals were opened up along the Subharn, the Menam Noi and the Lopburi off-shoots from the main Menam Chao Phya river. He also found that the lands along the last of these off-shoots were already in a prosperous condition and might safely be left alone until the others had been brought to an equal condition. It was chiefly for the improvement of the lands watered by these three off-shoots that the scheme of a great barrage at Jainadh had been suggested by a former irrigation expert. Sir Thomas Ward considered that such barrage, though doubtless a work of much potential value, might be left over for a time, and thought that it would suffice for the immediate needs of the country to spend 7,500,000 each on a complete system of scientifically constructed canals leading from the Subharn river, thoroughly carried out to the last detail of the field embankments and ditches. The cost of this last item, it should be noticed in passing, would be paid by the landholders but the construction would be carried out for them by the government engineers at an estimated outlay of about one tical a *rai* owned. It was an integral part of Sir Thomas Ward's scheme that this cost of embankments and ditches should be lent by the state to the landholders on suitable terms, to safeguard the community from the load of debt which has so frequently overwhelmed badly throughout irrigation enterprises, where the state, from want of experience, has not assisted the farmers in the right way at the right time.



A large dredger working on the upstream end of an important cut-off

No. 2. The Bhejaburi river, if provided with a barrage at Wad Dhagoi, could feed canals on either bank so as to ensure the rice crop against breaks in the rains. The barrage at the abovementioned spot and a canal for the tract lying between the river and the sea, would ensure a good measure of prosperity for the people of the district. If at a later date, further demand should arise, canals on the other side of the river, that is between the river and the hills could also be carried out.

No. 3. The works on the Prasak river were designed to complete the Glohng Rangsit system of canals, the lease of which lapsed to government in April, 1914. It appeared to be necessary to make this tract as prosperous as possible so that there might be no undue emigration of tenants to the Subharn, after the development of that district. Sir Thomas Ward urged that it was all important that what might be done in the inauguration of irrigation should be complete and thorough, so that the farmers all over Siam should realize the advantage to agriculture of modern scientific work.

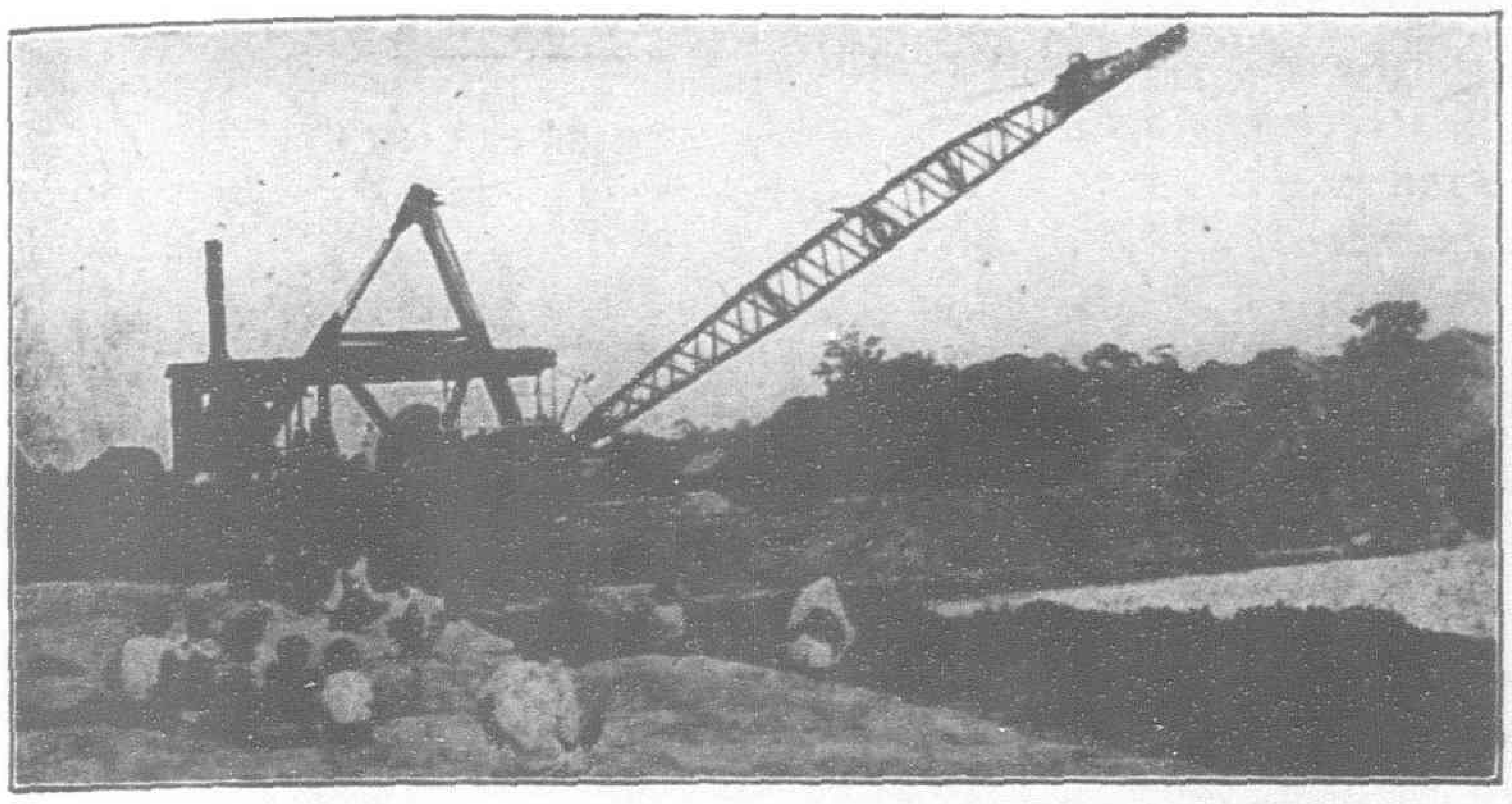
No. 4. Though Sir Thomas Ward was not directly concerned with questions of irrigation beyond the limits of the great central plain, circumstances brought the agricultural condition of the Bhayabh circle to his notice, and one of his officers, Mr. Freeman, while in the Krom Tang, examined the country and drew up a scheme for improving the rice-growing conditions of Nagorn Lampang. Sir Thomas Ward considered that the general scheme of Siamese irrigation should embrace the Bhayabh circle so that the harmonious development of rice-growing in the different parts of the kingdom could be secured, to the end that all might share alike in the benefits of the stable government it is the good fortune of the people to enjoy. Sir Thomas Ward recommended that the scheme for Lampang be sanctioned as soon as possible and that an officer should be sent to get out detail plans and estimates and at the same time work out preliminary projects for the other valleys of Bhayabh on the same lines as he was doing for the plains of Siam.

No. 5. Sir Thomas Ward considered that the further development of the navigation and drainage canals and flood control works, in the low, flat part of the central plains should be continued on much the same lines as those followed during the ten years preceding his deputation to Siam. He thought that 1,250,000 badh would be a suitable sum to ear-mark for expenditure on such works during the six or eight years it would take to construct the projects for which he was advising sanction.

Prasak Canal Project

Of the several projects drawn up the government decided, for various reasons, that the Prasak south canal scheme should precede the Subharn canal scheme, and preliminary work was begun at the end of 1914; actual construction work being started in November, 1915, when the necessary excavating machinery had arrived from the United States of America and had been erected.

The site for the headworks of the canal, as finally selected, is at Dha Luang, about 6 kilometres in a direct line from Dha Rua station on the northern railway. The original site proposed for the headworks was at Saraburi, but if they had been built there, the Prasak canal would have depended for all time solely on the Prasak river for its supply, and in the event of the Menam Chao Phaya ever being tapped by means of a weir at Jainadh or thereabouts, the Prasak canal system could not have benefitted thereby. With the headworks built at Dha Luang, the Prasak canal will become an important link in any big general system of irrigation from the main river that may be constructed in the future, as well as being properly situated to absorb the whole of the water available from the Prasak river.



One of three Class 175, B. Bucyrus Dragline Excavators working on the Siamese Government Irrigation System

The headworks consist of a barrage across the Prasak river, the head regulator of the canal, and two locks, one for through river traffic and the other for traffic between the river and the canal.

The barrage consists of 6 spans of 12.5 metres each, and is provided with single-lift steel gates worked on the Stoney principle of free rollers. These gates are probably the highest single-lift gates ever constructed on this principle. The piers and abutments are 12.0 metres above river bed, surmounted by steel towers and an overhead operating bridge, the total height from river bed to the platform of the bridge being 20.10 metres. The barrage is founded entirely on clay and, in order to attain an even intensity of pressure within safe limits over the whole bed when working under full load, the foundations have been constructed as a solid slab of concrete reinforced with steel rails pinned into the river bed by solid concrete extensions under the piers. The piers and abutments as well as all works at Dha Luang are constructed of random rubble masonry, worked up in courses, and in order to obtain a good through bond, concrete slabs reinforced longitudinally and transversely have been added at intervals. Cement mortar, with cement from the Siam Cement Company's works, has been used throughout and the stone used is a tough durable limestone that has been quarried by the irrigation department at their own quarries at Pak Prio.

The contract for the steel-work and the gates for the barrage was placed with Messrs. Glenfield and Kennedy, of Kilmárnock, Scotland. The head regulator of the canal consists of 8 spans of 4.2 metres each, provided with gates to work on the Stoney principle as adopted for the barrage. These gates were built by the department at their own workshops in Bangkok. The total cost of the headworks will amount approximately to Tcs. 2,300,000, being Tcs. 1,000,000 in excess of the original estimate, which was framed entirely on a pre-war basis.

The Main Prasak canal runs in a south-easterly direction to Nong Ge, a distance of 32 kilometres, where it bifurcates into two branches both connecting with the existing Rangsit system; the western branch joins Ghlong Hok Wah Sai Bon, and the southern branch Ghlong 13. The main canal at its head has a bed width of 40 metres and a depth of 3 metres. The designed slope is 1 in 13,500 and its discharge 100 cubic metres per second. Provision has been made for the crossing of four large drainages carrying about 120 cubic metres per second, and the works for these have been so constructed that their supply may be absorbed into the canal for irrigation purposes, or passed under the canal when not required. The main canal and branches are provided with locks and will afford a better waterway for traffic to the capital from the Prasak river, and also from that river to the Prachim side, than at present exists. In addition, provision is being made for the transfer of traffic from the canal to the northern railway at Nong quay where the Korat line crosses the main canal by means of a reinforced concrete bridge.

Distributing channels take off from the main canal and the two branch canals, and from these again minor channels and water courses deliver the water on to the individual cultivator's fields. The main canal, the western branch canal and the system of distributing channels connected with these are nearing completion, and actual irrigation from then will commence for the rice crop of 1921.

The area to be protected annually by direct irrigation is estimated at 100,000 hectares, or 625,000 rai. Furthermore by linking up the new system with the old communication canals and creeks to the southward of Ghlong Hok Wah Sai Lang and utilizing the surplus water of the Menam Nakonayok, a copious flow of fresh water will be provided for the great and fertile, though low-lying plain, bounded by the Rangsit area on the north, the Menam Chao Phya on the east and the sea on the south. This water which will replace the noxious saline fluid, inimical to plant and animal life, that now stands in the canals and creeks of this area for a great part of each year, will supply irrigation of the kind known as indirect, or flood irrigation, consisting of the alternate flooding and draining of the land by one and the same set of channels according as desired. Thus in addition to the area directly affected, a very large tract will be indirectly benefitted by the system. It is to be noted that to obtain the best results in rice cultivation an efficient drainage system is practically as important as the supply of water.

The revised estimate for the Prasak project at present stands at Tcs. 13,300,000 and the expenditure up to March 31st, 1919 is as follows:

2458 B. E. (1915-16)	.. ..	Ticals.	388,402*
2459 B. E. (1916-17)	.. ..	,,	1,273,559
2460 B. E. (1917-18)	.. ..	,,	1,664,015
2461 B. E. (1918-19)	.. ..	,,	2,655,382
2462 B. E. (1919-20)	.. ..	,,	2,495,812
2463 B. E. (1920-21)	.. ..	,,	3,884,289
	Total ..	,,	12,361,459

*Includes expenditure on other projects Tcs. 238,815.24

Of the above sum Tcs. 2,000,000 has been expended on machinery, stores and plant which will be available for use on other projects if sanctioned.

Kawasaki Estimating on Sydney Bridge

The Kawasaki Dock Yard Company of Kobe some time ago received an invitation from the government of New South Wales, Australia, for an estimate on a bridge to span a gulf of the Sydney Bay which bridge is expected to be one of the longest bridges in the world. The bridge is to be 1 mile long, 100-ft. wide, with four broad-gauge car tracks, one automobile road, and two roads for pedestrians. Any of the largest battleships afloat in the world will be able to pass beneath the bridge.

Workshops of the N.E.I. Railways

CHIEFLY for the up-keep of the rolling stock, consisting in 1919 of more than 500 locomotives, 1,600 carriages and 11,000 cars and also for the repairs necessary to keep the other railway works in good order and also for the construction of new lines, the service of the state railroads-and tramways possesses in Java six workshops, viz., three main workshops at Manggarai, at Bandoeng and at Madioen and three auxiliary workshops at Poerworedjo, at Sourabaya-Goebeng and at Djember.

The short enumeration proves clearly that the range of work done in these workshops and especially that by the main workshops is more manysided and intricate than generally is the case in Europe for such establishments. Assistance from the private industry is almost wholly excluded; on the contrary, often assistance has to be given to private persons or companies and also to other government's services. Every part of the work has to be executed by the workshops themselves, consequently the extent of the forges and the foundries forms a striking feature.

The situation of these workshops at nearly equal distances along the mainline, which has developed chiefly in a longitudinal direction, may in general be considered a very good one; for instance the workshops at Manggarai and at Sourabaya-Goebeng, which are situated near the two largest harbors on Java's northcoast, viz., Tandjong-Priok and Sourabaya, also those of Poerworedjo near the growing port of Tjilatjap on Java's southcoast, are favorably situated with regard to the accumulation of rolling stock in the neighborhood of these harbors, whereby the transport of defective rolling stock has been reduced to a minimum. The work shops at Bandoeng, situated in the midst of its plateau, have chiefly to repair the heavy mountain-locomotive, running on the Preanger lines and of the other rolling stock, used on this plateau, which stock has therefore not to be transported for repairs over the mountain-lines of the railway with their limited traffic capacity. The workshops at Djember situated in the centre of Eastern Java has to keep in good order the stock, used in these more remote parts of the country.

The mainwork shops at Madioen are less favorable situated.

It stands to reason that the capacity of the workshops had to keep pace with the very rapid increase of the rolling stock; consequently during the period from 1912 till now.

(1) A quite new workshop for cars and carriages was built at Sourabaya-Goebeng instead of the old one at Sourabaya-kotta, which could not be enlarged.

(2) The workshop at Madioen was enlarged and modernised, but in such a way and on such a scale that it might be considered as a newly built one.

(3) Quite new, modern mainwork shops were built at Manggarai as a substitute for the old ones of the N. I. S. at Boekit Doeri (Meester-Cornelis), which also could not be enlarged.

(4) The other workshops—especially those at Poerworedjo—were more or less extensively enlarged with regard to buildings as well as to equipment.

Next some figures may be mentioned to give an idea of the working range of the shops.

On the first of January, 1919, there were employed in the different workshops. :—

	Laborers	Apprentices	Coolies
Manggarai	652*	125	86
(for the greater part still in erecting stage)			
Bandoeng	1,009	73	245
Poerworedjo	390	40	20
Madioen	1,332	176	144
Sourabaya-Goebeng	892	100	100
Djember	444	70	74
Total ..	4,719	584	669

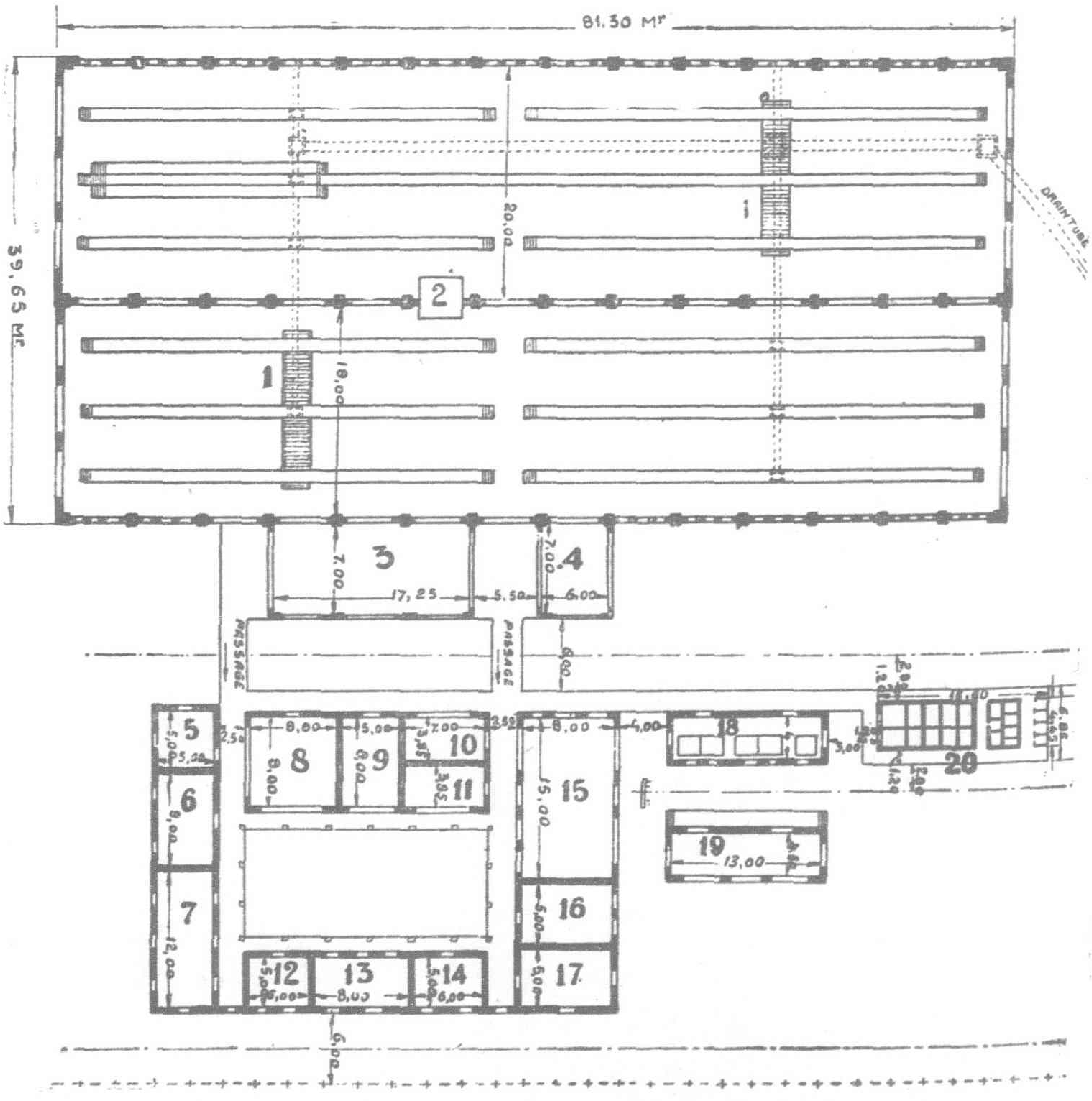
or in total 5,972 men, supervised by one chief engineer, 7 engineers, 9 mechanical inspectors, 26 foremen, 32 overseers, 13 apprentices and 40 shift-foremen.

During the year 1918 there has been paid on wages and salaries *f* 1.285, 628, 37 and *f* 484, 705, 71 respectively.

The motive power of the workshops is partly electrical and partly derived from steam-engines.

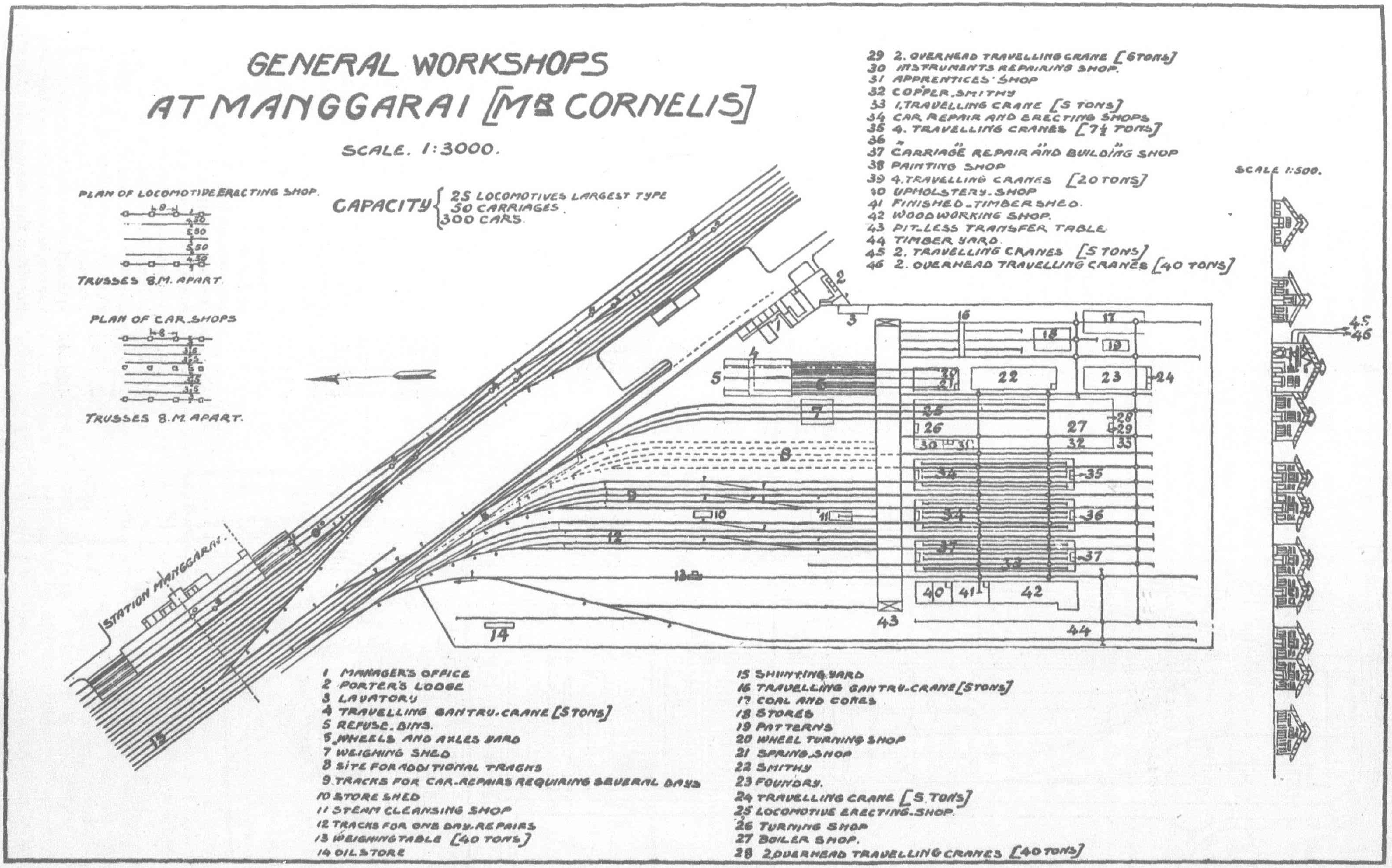
---

* This number will be more than doubled when the erecting of the workshop delayed by the war, is wholly finished.



LOCOMOTIVE SHED AT MEESTER CORNELIS

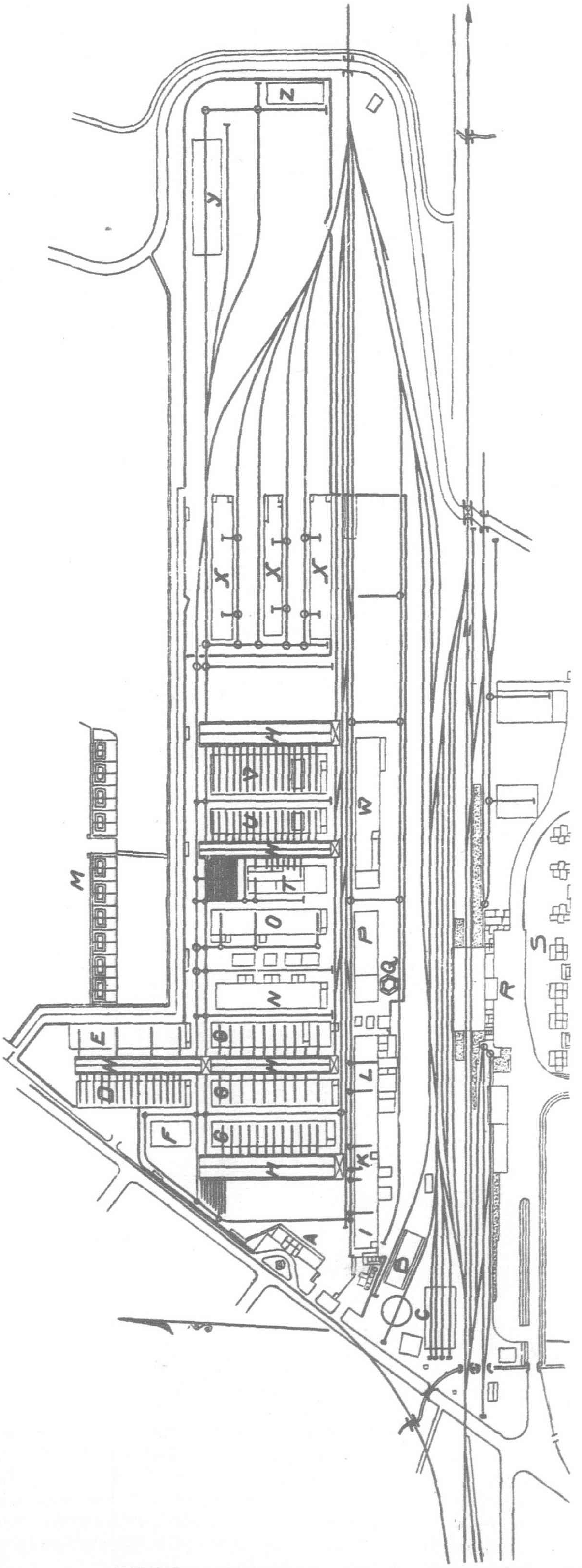
1	Transverse Axle Pit
2	Foreman's Office
3	Electric Equipments' Repair Shop
4	Smithy
5	Foreman's Office
6	Assistants' Office
7	Office
8	Store for Finished Parts
9	do.
10	Night Firemen's Tools
11	Cloak Room
12	European Employee's
13	Lecture Room
14	European Employee's
15	Store for Unfinished Parts
16	Native Drivers
17	Native Firemen
18	Oil Tank Room
19	Oil Drumstore
20	Bathrooms and W.C.'s



GENERAL WORKSHOPS AT MANGGARAI [MR CORNELIS]

SCALE. 1:3000.

CAPACITY { 25 LOCOMOTIVES LARGEST TYPE
50 CARRIAGES.
300 CARS.
PLAN OF LOCOMOTIDE ERECTING SHOP.
8
4,30
5,50
5,50
4,30
TRUSSES 8.M. APART.
PLAN OF CAR SHOPS
8
3,5
3,5
3,0
3,5
3,5
TRUSSES 8.M. APART.
STATION MANGGARAI
SCALE 1:500.
45
46
1 MANAGER'S OFFICE
2 PORTER'S LODGE
3 LAVATORY
4 TRAVELLING GANTRY.CRANE [5 TONS]
5 REFUSE. BINS.
5 WHEELS AND AXLES YARD
7 WEIGHING SHED
8 SITE FOR ADDITIONAL TRACKS
9 TRACKS FOR CAR-REPAIRS REQUIRING SEVERAL DAYS
10 STORE SHED
11 STEAM CLEANSING SHOP
12 TRACKS FOR ONE DAY-REPAIRS
13 WEIGHING TABLE [40 TONS]
14 OIL STORE
15 SHUNTING YARD
16 TRAVELLING GANTRY-CRANE [5 TONS]
17 COAL AND COKES
18 STORES
19 PATTERNS
20 WHEEL TURNING SHOP
21 SPRING SHOP
22 SMITHY
23 FOUNDRY.
24 TRAVELLING CRANE [5 TONS]
25 LOCOMOTIVE ERECTING-SHOP.
26 TURNING SHOP
27 BOILER SHOP.
28 2 OVERHEAD TRAVELLING CRANES [40 TONS]
29 2. OVERHEAD TRAVELLING CRANE [6 TONS]
30 INSTRUMENTS REPAIRING SHOP.
31 APPRENTICES' SHOP
32 COPPER SMITHY
33 1. TRAVELLING CRANE [5 TONS]
34 CAR REPAIR AND ERECTING SHOPS
35 4. TRAVELLING CRANES [7½ TONS]
36 " " " "
37 CARRIAGE REPAIR AND BUILDING SHOP
38 PAINTING SHOP
39 4. TRAVELLING CRANES [20 TONS]
40 UPHOLSTERY SHOP
41 FINISHED-TIMBER SHED.
42 WOODWORKING SHOP.
43 PIT-LESS TRANSFER TABLE
44 TIMBER YARD.
45 2. TRAVELLING CRANES [5 TONS]
46 2. OVERHEAD TRAVELLING CRANES [40 TONS]



GENERAL WORKSHOP AT MADIOEN

A. Head office
B. Coal shed
C. Locomotive shed
D. Tender shop
E. Boiler shop
F. Coppersmithy

G. Locomotive repair shops
H. Transverse tables
I. Small fittings' shop
K. Turning shop
L. Larger fittings' shop
M. Native workmen's compound

N. Foundry
O. Smithy
P. Finished timber shed
Q. Water tower
R. Station building
S. Officer's houses

T. Wheel and tire shop
U. Car repair shop
V. Carriage repairing and building shop
W. Woodworking machinery and carpenters' shop

X. Stores
Y. Coal shed
Z. Tar, oil and inflammable matter

Electric power is used in the workshops at Manggarai, Bandoeng, Madioen and Sourabaya-Goebeng.

In this connection it may be observed that Madioen and later on Manggarai also, receive the necessary current from governmental central stations, whilst the two other workshops are connected to local electric power plants.

The kind of current, however, is the same in all the workshops, viz., three-phase current of 220 volts at 50 periods per second.

A reserve of calorie energy is to be found in the workshops at Bandoeng and Madioen, as to that at Manggarai and Sourabaya-Goebeng, the reserve power is provided for by the local central station.

All the workshops with exception of the new one at Manggarai, are built on the transversal system with tracks (traverse to the main ones) for the locomotives, carriages or cars placed in several buildings, whilst their transportation is effected by means of transfer tables between those buildings, e.g., as shown in the plan of the workshops at Madioen.

The workshop at Manggarai is built according to the longitudinal system, whereby the rolling stock is put on in groups of three tracks, the middle one serving for circulation.

These tracks are placed longitudinally in the buildings. The transposition is effected by means of highly elevated traveling-cranes.

In connection with this it ought to be mentioned that the distances between the tracks and the height of the locomotive erecting shop are dimensioned in such a manner, that, when during busy times the middle tracks are also filled up with locomotives to be erected, revised or repaired, every engine may be lifted and transported clear over the other ones. This requirement necessitates a great height of the building but at the same time it allows the application of light erecting cranes traveling under the heavy transfer-cranes.

With the longitudinal system it is evident that similar cranes are used for lifting cars and carriages, which with the transversal system is effected by means of either cranes or gantry cranes c. q. jackscrews and carriage jacks.

For the new following short survey of the arrangement and methods of the workshops these at Manggarai and at Madioen are taken as examples, because in these both systems have found an expressive application (*vide* the appended ground-plans).

To both workshops is adjoined a small shunting yard either for the collection of the already repaired or the distribution of the to be repaired rolling stock over the different departments or to keep it at the disposal of the traffic-service.

In both workshops the locomotive and also the carriage and carshops have got a common machine-shop, which at Madioen is situated between those sections but at Manggarai partly between them (turning and fittingshop) and partly outside (forge, foundry) in such a manner, however, that as much as possible the transport is following one line and is limited to a minimum.

The mechanical woodworking department is in both cases situated as near as possible to the carriage building shop, therefore here also the transportation is limited to a minimum, whilst the timber is as nearly as possible following a straight line from the staple-yard to the saws.

Furthermore, provision has been made that future extension is rendered possible without interruption of the logical sequence of the whole scheme, which condition may be satisfied entirely, especially with the longitudinal system, by simply lengthening the sheds without in any way impairing the conjunction of the different departments.

The workshops' capacity comprises at Madioen 36 locomotive stands and 36 roof-covered carstands, whilst at Manggarai, initially, provision has been made for the simultaneous presence of 20 locomotives, 50 carriages and 300 cars (the repairs of the latter can mostly be effected in the open air, for which purpose a large yard with the necessary tracks is reserved in front of the workshop buildings.

Although the motive power for both workshops is the same, viz., three-phase current at 220 volts, there is some difference in the driving, to wit, at Madioen in groups, whereby one motor drives a mainshaft supplying power to several machines whilst at Manggarai the single drive system has been preferred, whereby every machine or lathe is driven by its own separate motor fixed to it.

About the arrangement of the cranes in the workshops at Manggarai the following may be mentioned in addition. In the locomotiveshop there are two lifting and traveling cranes with a capacity of 40 tons each with railtracks elevated to such a degree that if need be a locomotive may be lifted and transported right over the other ones. As already has been pointed out, the object of this is to be able to place locomotives on the middle track also when the side-tracks are insufficient or too crowded. These cranes serve also to transfer the boilers to the boilershop which is situated at the back of the locomotiveshop.

Under these elevated tracks are situated those for the 5 tons traveling erecting cranes.

The frequently occurring necessity to carry heavy pieces in the turning shop and in the foundry is served by cranes also of 5 tons capacity.

In the sheds destined for car-repairs there are installed eight 7½ tons traveling cranes acting in pairs and destined to lift cars.

In the carriage-shed we find four 20 tons cranes for the raising of carriage-bodies and also working in pairs. The crane-tracks in the car and carriage sheds, however, are not so elevated, that the vehicles can be lifted clear over each other, such as is the case in the locomotive shop.

On the yard there are furthermore two gantry cranes of 5 tons capacity, one is moving above the wheel-yard, the other one above an open space, where engine-cabs, tenders and such parts are repaired.

In front of the various buildings a "surface traverser" of 40 tons carrying capacity is moving transversely to facilitate the transport in the workshop.

This table has not a sunken track therefore it does not impede the pedestrian traffic in the workshop contrary to the transfer tables at Madioen, which all of them are of less recent design and wholly sunk below ground level.

Mining in Celebes

At a meeting of the geological and mining society for the Netherlands and colonies at Delft Mr. K. van Vuuren, head of the encyclopedic service in India, lectured on the question as to whether Celebes as a mining country has a future.

First then, from a theoretical standpoint, it may be said that metallic substances are to be found in Celebes; but it is also quite certain that there are non-metallic substances there also such as phosphate and nitrate in the lime, precious stones, mica which is to be found in large quantities at Banggai, sulphur in every warm spring, potteryclay and sand for manufacturing glass, and the fossil remains of timber.

Secondly, the situation of Celebes for less valuable mining products is unfavorable. Of course there will come an improvement in our transit-trade, should our archipelago play again the roll of "half-way house" between China and Japan on the one side and Australia on the other side; but this can only have a small influence on mining in Celebes.

Thirdly, traffic conditions on the whole are unfavorable, except in the south-west, and the Malili country.

And lastly, the condition of the soil and the matter of obtaining labor may be regarded as favorable. Food-supplies are excellent.

Resuming once more, Mr. van Vuuren came to the following conclusion: First, there is some reason for mining in Celebes, as in the Verbeek mountains prospecting is easy, provided the electro-metallic process can be used for the ores and the rollers for working up the iron according to the methods drafted by Mr. Koomans can be established there.

The investigation into the possibility of working up the ores by electro-metallurgy ought to be carried out in Holland where a staff of scientific men and extensive laboratories exist so plentifully.

Secondly, the working of the lime by judicious planning and by the use of water-power will give fresh impetus to the nitrogen business which will not be exclusively limited to that particular manufacture; but there must also be a thorough grasp with regard to the working up of ores by electro-metallurgy.

Thirdly, primitive methods have been employed hitherto by the population, but under the supervision of an experienced mining overseer their working of the inferior layers can be greatly improved.

Fourthly, only those coal-fields in the Maros-district which are necessary to the laying down of a tram-line there, are worth exploiting. The rest of the fields cannot at present be exploited with profit owing to transport difficulties.

Fifthly, with full appreciation of the work carried out individually by our mining engineers in India, it must be said, however, that the way in which it has been done is not altogether satisfactory. In the first place a distinction must be made between the researches made in India and those to be made outside the archipelago; namely there must be co-operation between the scientific centres in the west and those practically developing the lands in the east. There must also be co-operation between the different government organizations on the spot, while more importance must be attached to the results obtained by private enterprise instead of the thwarting attitude adopted by the authorities hitherto.

Sixthly, with regard to the precious metals, brown coal and petroleum, Celebes would appear according to the latest reports to have no future as a mining country.

Lastly, in connection with the desired co-operation between the scientific centres in Europa and those doing the practical work of developing the lands in the east, Mr. van Vuuren himself accepts the idea, lately established and explained by this society, of tracing by the natural method of research into ores, in accordance with their physical properties.

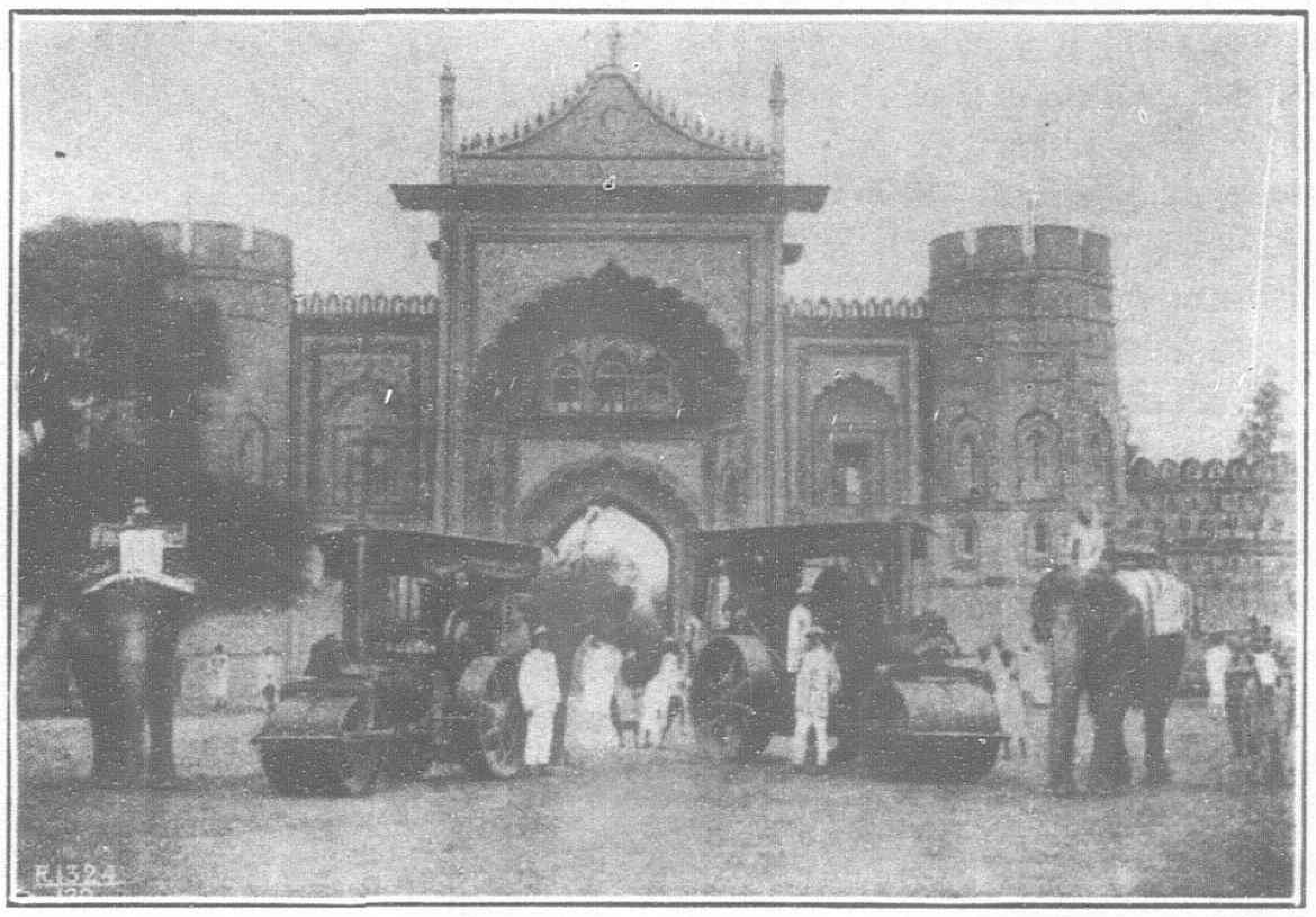
American Colleges for Oriental Women

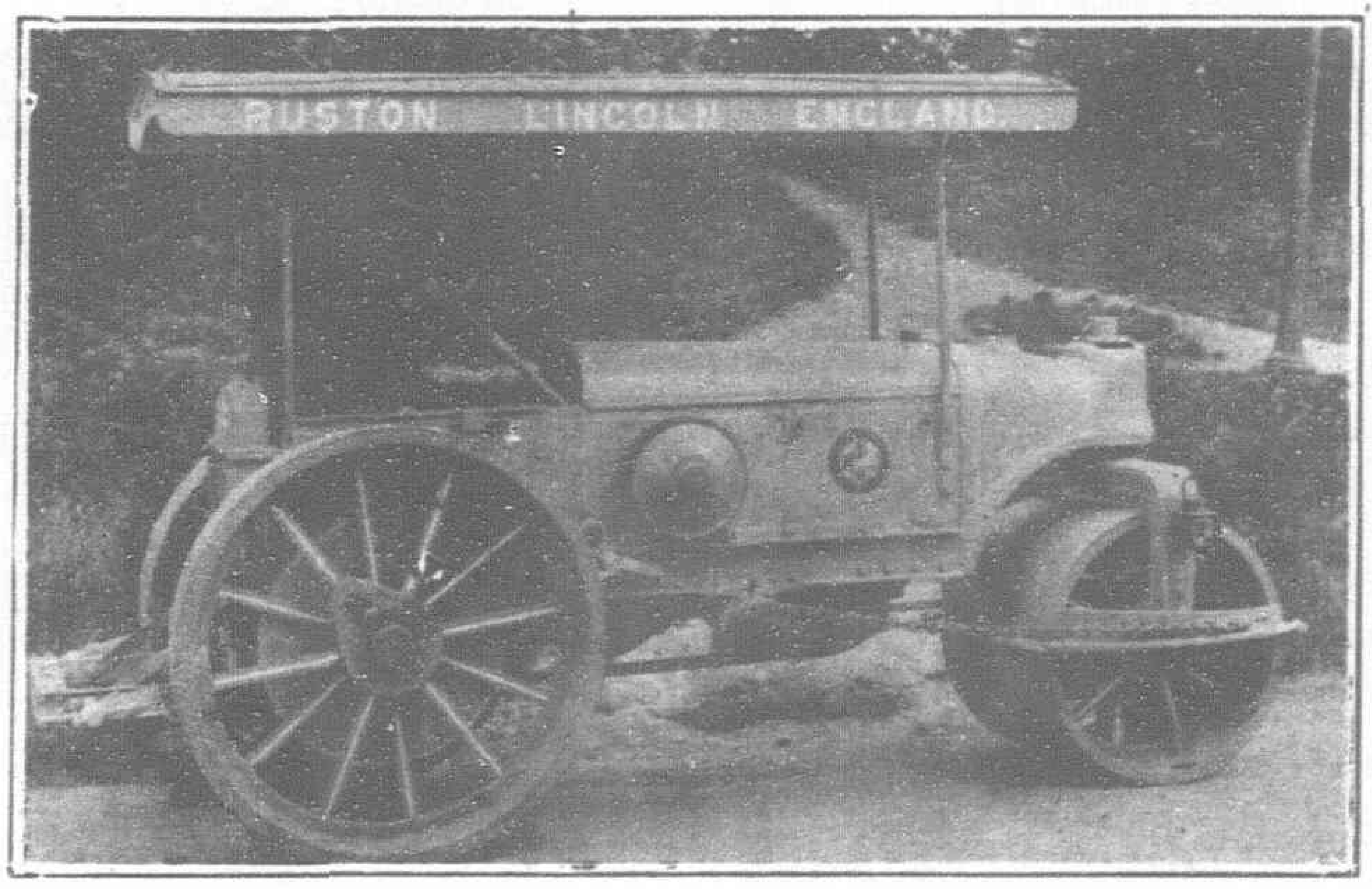
Just at this time when the church and college women of the United States are in the midst of a campaign to raise $2,000,000 for the Women's Union Christian Colleges of the Orient in order to secure a gift of $1,000,000 offered conditionally by Mr. Rockefeller, the question is frequently asked what and where the colleges are, why they are needed, and by whom and how they came to be selected.

There are seven of the institutions, five colleges and two medical schools. They are the Woman's Christian College at Madras, India; Ginling College at Nanking, China; Isabella Thoburn, Lucknow, India; Women's Medical School at Vellore, India; Yenching College at Peking, China; North China Medical, also at Peking, and the Woman's Christian College at Tokyo, Japan.

STEAM ROLLERS FOR CHINESE ROADS

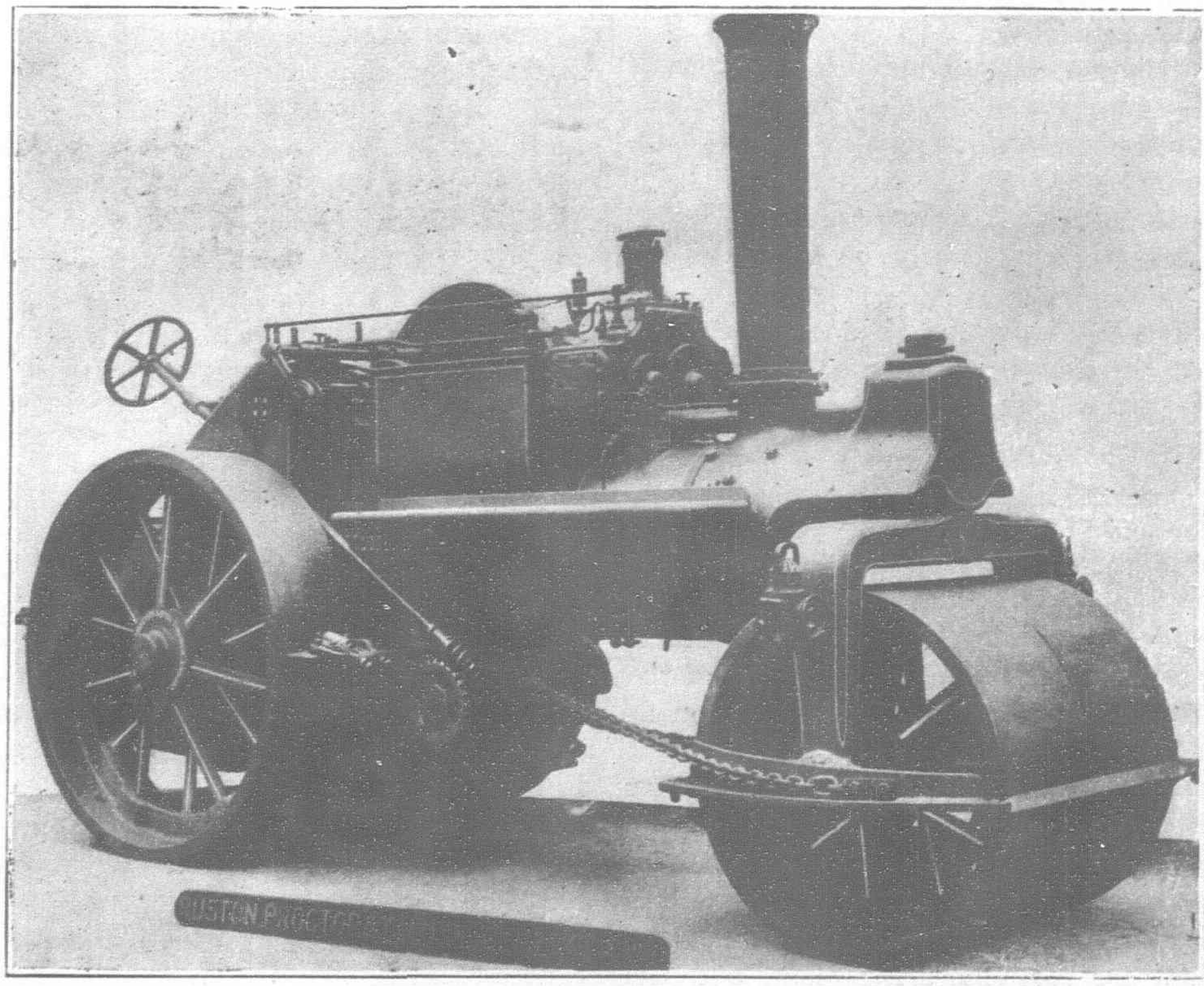
WITH the construction of new roads throughout the country, the Chinese are turning more and more to the modern steam-roller and discarding the old stone or cement-filled iron cylinders hauled by gangs of coolies. Several orders for these machines have been placed in Shanghai for interior road work and the future holds bright for an increasing demand not only for rollers but other modern road-making machinery. Foremost amongst the manufacturers who have developed the road roller to its present high state of efficiency, stands the great British firm of engineers, Messrs. Ruston & Hornsby, Ltd., of Lincoln, England. This firm has met with great success in India, Dutch East Indies, Straits and other parts of Asia, and several of their machines are at work in China and many others in Japan.


Ruston Rollers at the Entrance to the Palace of H.H. the Nawab of Ramphin, India.



The Ruston Motor Road Roller

Under all kinds of conditions and in all parts of the world the Ruston rollers are proving in actual use their economy, durability and all-round efficiency. They are made with either single or compound cylinders and in sizes from 5 to 18 tons. In addition to the well-known standard type, this firm makes the Ruston convertible, so built that by easily effected alterations it can be converted into a traction engine. These engines are of exceptional value to municipal authorities, estate owners and road builders, where a roller is not needed for constant use.



Ruston Compound Road Roller

One of their specialties is a motor roller, made in 6, 7, 8 and 9-ton sizes. They are of the three-wheel type, driven by a two-cylinder vertical paraffine engine placed longitudinally on the frame. They present a very smart appearance, are easily handled, with large wheels and have three speeds, viz., 2.5, 1 and ½ miles per hour.

The present firm of Ruston & Hornsby, Ltd., is the amalgamation of two old established engineering firms dating back to 1815, Ruston, Proctor & Company, Ltd., of Lincoln, and Richard Hornsby & Sons, Ltd., of Grantham, both pioneers in their lines. In the development of road rollers the name of Ruston has become famous throughout the world and won for its makers the highest awards in many international engineering exhibitions.

In the Ruston compound road roller is found the highest development of these machines. They are made in sizes ranging from 5 to 17 tons empty, rolling a surface of from 5-ft. 9-in. to 7-ft. 3½-in. These rollers are fitted with compound cylinders, the advantages of which are too well-known to need much mention. However, it is well to draw attention to the suitability of this system. In the first place the greater degree of expansion obtained, means that more work is got out of a given volume of steam than when it is only expanded in one cylinder, and therefore, there is a great saving of fuel and water. A further advantage is that owing to the low pressure at which the used steam exhausts into the atmosphere it does so with much less noise, which is a consideration when working in street traffic.

The cylinders are placed side by side with the cranks set at right angles. This eliminates the dead centre position of a single crank, and enables a start to be made on steep inclines by simply opening the throttle valve, and without reversing. In addition, the full pressure on the piston acts equally in all positions of the crankpin. Thus the engine works smoothly and without jar and an extra heavy flywheel is not necessary. An auxiliary valve is provided for admitting high-pressure steam direct into the low-pressure cylinder, giving greatly increased power for starting and climbing on very steep inclines.

Owing to the compound engine developing more power from the same amount of steam than a single-cylinder engine, the rate of fuel combustion is much slower than in the firebox of a single cylinder engine developing the same power, owing to the demand on the boiler not being so severe, consequently the firebox and boiler tubes of the compound road roller will last much longer than those of the single cylinder road roller.